

CA4 ON HBL U16
H818
1984



URBAN/MUNICIPAL

URBAN/MUNICIPAL

1984 HAMILTON-WENTWORTH COLLISION REPORT

PREPARED BY:

THE CITY OF HAMILTON TRAFFIC DEPARTMENT

1984 HAMILTON-WENTWORTH COLLISION REPORT

Prepared For:

The Regional Municipality of Hamilton-Wentworth
Engineering Department

The Hamilton-Wentworth Regional Police Department

By:

The City of Hamilton Traffic Department

H.O. Schweinbenz, P. Eng.
Commissioner of Transportation
Hamilton-Wentworth Regional
Engineering Department

R. Hamilton
Chief of Police
Hamilton-Wentworth Regional
Police Department

M. F. Main, P. Eng.
Director of Traffic Services
City of Hamilton

PROJECT STAFF:

J. G. Hindson, P. Eng.
H. L. Solomon, P. Eng.

ACKNOWLEDGEMENTS

The Project Staff of the Hamilton Traffic Department wish to express their appreciation to the members of the Regional Engineering Department, the Regional Police Department and the Provincial Judges Court for their co-operation and assistance in the conduct of this study.

The Project Staff would also like to acknowledge the efforts of Mrs. M. Strong, Mrs. W. Crevier, Miss R. Mills, Mrs. P. Pauls, Mr. T. Hardy, Mr. J. Danby of the Traffic Department; Mr. J. Speyker and the Staff of the Services Department; and Members of the Systems Division of the Hamilton Treasury Department for their assistance in the preparation of this report.

1984 HAMILTON-WENTWORTH MOTOR VEHICLE COLLISION REPORT

Introduction

This annual report is a summary of factors associated with traffic collisions that occurred in the Regional Municipality of Hamilton-Wentworth in 1984.

Traffic collisions are a primary cause of accidental deaths (Appendix Exhibits A-1, A-2, and A-3), injuries and associated property losses. The intention of this report is to provide factual information to those agencies and persons concerned with the safety of the roadway transportation system within the Regional Municipality of Hamilton-Wentworth.

Traffic collisions frequently involve complex interactions between human behavior, vehicle characteristics, and the environment. The factor or factors responsible for causing a collision are not always the most obvious nor are they always readily apparent. Caution should be exercised in drawing conclusions from the statistics presented in this report and conclusions should be drawn only with appropriate qualifications and supportive information.

Additions Incorporated Into the 1984 Collision Report

For 1984, the Hamilton-Wentworth Collision Report has an added special features section. As there are areas of research interest for which it is not possible to produce automated reports, the collision report will, starting with the 1984 report, feature special analyses performed by hand. This year, the focus is on non-reportable bicycle accidents.

In Hamilton, collisions involving a bicycle are only considered reportable if the cyclist was involved in a collision with a motor vehicle on the public roadway. Thus, collisions such as those involving two cyclists, those involving a cyclist with a pedestrian, or those involving a cyclist with a motor vehicle on private property are not considered reportable, and are not included in analyses such as Figure 3-15 in this report. Any collision involving less than \$400 property damage without personal injury occurring is also not included.

As the following exhibit shows, there were a total of 36 non-reportable collisions involving bicycles in 1984 in Hamilton-Wentworth. One-third of these (12) involved a cyclist and a motor vehicle in which no injury occurred. While occasional comments are received about bicycles interfering with pedestrians, only five collisions were reported to the Hamilton-Wentworth Regional Police involving a bicycle colliding with a pedestrian.

1984 Non-Reportable Bicycle Accidents

<u>Collision Involved</u>	<u>Collision Occurred On:</u>		<u>Total</u>
	<u>Private Property</u>	<u>Regional Property</u>	
One Cyclist	0	7	7
More Than One Cyclist	0	2	2
Cyclist With Pedestrian	0	5	5
Cyclist with Motor Vehicle	8	12	20
Cyclist With Parked Motor Vehicle	<u>2</u>	<u>0</u>	<u>2</u>
TOTAL	10	26	36

	<u>Page</u>
CHAPTER ONE - TRENDS	1
General	2
Normalizing The Data	2
Collisions	2
Injuries	3
Fatalities	3
Alcohol Involvement	3
CHAPTER TWO - SELECTED CHARACTERISTICS	14
Injuries	15
Seatbelts	15
Motorcycle Injuries	15
Damages	16
Times of Occurrence	16
Impact Types	16
References	17
CHAPTER THREE - DRIVERS	29
Driver Age	30
Drinking Drivers	30
Hit and Run Collisions	30
Non-Licensed Drivers	31
Moving Violations	31
Motorcycles	31
Bicycles	32

	<u>Page</u>
CHAPTER FOUR - PEDESTRIANS	50
General	51
Age	51
Pedestrian Action	51
Time of Collision	51
Pedestrian Condition	52
Locations	52
Driver Action	52
Pedestrian Injuries	52
CHAPTER FIVE - VEHICLES	64
Vehicle Type	65
Vehicle Defects	65
CHAPTER SIX - ENVIRONMENT	69
Light Conditions	70
Road Surface	70
Pavement Markings	70
Road Character	70
Road Location and Traffic Control	71
Road Condition	71
Fixed Objects	71
CHAPTER SEVEN - LOCATIONS	82
General	83
Area Municipality	83
High Frequency Intersection Locations	83
High Frequency Road Section Locations	83

EXHIBIT		PAGE
1-1	Traffic Collision Rates - 1951 to Date Personal Injury Collision Rates - 1954 to Date	4
1-2	Personal Injury Rates in Traffic Collisions - 1951 to Date	5
1-3	Fatality Rates in Traffic Collisions - 1951 to Date	6
1-4	Collision Statistics - Historical Trends	7
1-5	Personal Injuries And Fatalities - Historic Trends	9
1-6	Collisions with Alcohol Involvement - Historic Trends	11
1-7	Pedestrian and Cyclist Injuries - Historic Trends	13
2-1	Injury Status of all Persons Involved	18
2-2	Driver Injury Status vs Safety Equipment in Use	19
2-3	Motorcycle Driver Injuries	20
2-4	Property Damage Estimates	21
2-5	Estimated Damage to Motor Vehicles	21
2-6	Time Of Day Versus Collisions And Traffic Volume	22
2-7	Collision Occurrences By Time of Day And Day of Week	23
2-8	Day Of Week Versus Collisions And Traffic Volume	24
2-9	Month of Year Of Occurrence Of Collisions	25
2-10	Initial Impact Type Versus Classification	26
2-11	Initial Impact Type Versus Road Location	27
2-12	Initial Impact Type Versus Type of Traffic Control	28
3-1	Licensed Motor Vehicle Driver Age Versus Collision Involvement	33
3-2	Motor Vehicle Driver Age Versus Driver Action	34
3-3	Alcohol Involvement Versus Collision Classification	36
3-4	Time Of Day And Day Of Week Of Collisions Involving Alcohol	37
3-5	Driver Action Versus Driver Condition	38

EXHIBIT		PAGE
3-6	Motor Vehicle Driver Age Versus Driver Condition	40
3-7	Hit And Run Collisions	42
3-8	Hit and Run Collision Classifications	42
3-9	Licence Status Of Motor Vehicle Drivers Versus Classification Of Collision	43
3-10	Licence Status Of Motor Vehicle Drivers Versus Driver Condition	43
3-11	Licence Status Of Motor Vehicle Driver Versus Driver Action	44
3-12	Time Of Day Versus Collisions For Total Collisions Including Non-Licensed Driver And Collisions Involving Alcohol	45
3-13	Improper Driver Action Versus Enforcement	46
3-14	Motorecycle Driver Age Versus Driver Action	47
3-15	Cyclist Action Versus Age of Cyclist	48
4-1	Pedestrian Age Versus Population	53
4-2	Pedestrian Age Versus Action	54
4-3	Pedestrian Age Versus Action at Traffic Signals	56
4-4	Time of Day Versus Pedestrian Age	58
4-5	Pedestrian Condition	59
4-6	Pedestrian Age Versus Type of Traffic Control	60
4-7	Driver Action in Pedestrian Collisions	62
4-8	Pedestrian Age Versus Injury Status	63
5-1	Driver Action Versus Vehicle Type	66
5-2	Vehicle Defects	68
6-1	Visibility Conditions	72
6-2	Light Conditions	72
6-3	Road 1 Surface Conditions	73

EXHIBIT		PAGE
6-4	Road 1 Pavement Markings Versus Road Surface Conditions	73
6-5	Road Character for Collisions Occurring at Intersections	74
6-6	Road Character for Collisions Not Occurring at Intersections	74
6-7	Road Alignment for Collisions Occurring at Intersections	75
6-8	Road Alignment for Collisions Not Occurring at Intersections	75
6-9	Location of Collisions	76
6-10	Traffic Control Versus Class of Collision	77
6-11	Traffic Control Versus Road Location	78
6-12	Road Condition	79
6-13	Fixed Objects Struck Versus Road Location	80
6-14	Fixed Objects Versus Class of Collision	81
7-1	Collisions Versus Area Municipality	85
7-2	Intersections with Highest Number of Collisions in 1983	86
7-3	Signalized Intersections with Highest Collision Rates in 1984	89
7-4	Overall Collision Rates for Selected Groups of Signalized Intersections	93
7-5	Roadway Sections With the Highest Collision Rates, 1980 - 1984, City of Hamilton Arterials (All Signalized Intersections Included)	94
7-6	Roadway Sections With the Highest Collision Rates, 1980 - 1984, City of Hamilton Arterials (Signalized Intersections Not Included)	97
7-7	Roadway Sections With the Highway Collision Rates, 1980 - 1984, City of Hamilton Arterials (Intersections Not Included)	99
7-8	Arterial Roadway Sections Collision Rates for Selected Groups	102

- A-1 Causes Of Death 1980
- A-2 Accidental Causes Of Death 1980
- A-3 Accidental Causes Of Death 1980 (15 Years Of Age and Under)
- A-4 Population And Registration
- A-5 Motor Vehicle Accident Deaths and Rates
- A-6 Hamilton/Hamilton-Wentworth Pedestrian Injury Rates Historic Trends
- A-7 Trends Data - Regression Equations
- A-8 New Drivers' Collision Rates
- A-9 Collision Statistics - Selected Canadian Cities

1984 HAMILTON-WENTWORTH COLLISION REPORT**Summary:**

* In 1984, 7,228 reportable traffic collisions occurred on municipal roadways in the Region of Hamilton-Wentworth. These collisions resulted in:-

- 12 driver or passenger fatalities (5 motor vehicle drivers, 4 motorcyclists, 1 bicyclist and 2 riders or passengers)
- 6 pedestrian fatalities
- 3,535 driver, bicyclist or passenger injuries
- 320 pedestrian injuries
- 20,475 persons (equal to approximately 5 percent of the Regional population) being involved in a reportable traffic collision in 1984
- approximately 14.5 million dollars in property damages (as estimated at the time of the collision)
- 43 million dollars (estimated) in damages when all collision costs including medical costs, loss of income and other related costs are taken into account (see Note 2.3)

* The overall frequency of collisions in Hamilton-Wentworth is generally lower than other major Canadian municipalities.

* The overall frequency rates of fatalities in the City of Hamilton are generally lower than other Canadian and U.S. cities of similar population.

* The period from 12 midnight to 5 a.m. exhibits the highest ratio of collisions to vehicle volume using the street system.

* The greatest causes of traffic collisions were driver or pedestrian error; either errors in judgement or perception, or non-observance of traffic regulations.

* The predominant improper driver actions indicated in collisions were "following too close" and "failure to yield right-of-way".

* Drivers under 20 years of age were involved in a disproportionate number of collisions relative to the number of drivers in this age group that are licenced to drive. This age group was involved in 9.3 percent of the reported collisions although it comprises only 7.2 percent of the licenced driving population.

* Ten and one-tenth percent of reported collisions involved one or more drivers who had been drinking.

* Alcohol was associated with a high proportion of collisions (36 percent) which occurred in the hours between 10 p.m. and 3 a.m. from Wednesdays to Sundays and in night-time collisions (23.6 percent of collisions between 6 p.m. and 6 a.m.).

Note: These figures are indicative of alcohol being present in the bloodstream of one or more of the drivers involved in the collision and do not necessarily suggest that alcohol was the proximate cause of the collision.

* Non-licensed drivers were less likely to be driving properly, and more likely to be under the influence of alcohol or drugs when involved in a collision.

* Motorcycle operators were more likely to be driving properly at the time of the collision and more likely to receive injuries if involved in a traffic collision.

* Children between 5 and 9 years of age were involved in a disproportionate number of pedestrian collisions (16.0%) compared with their proportion of the regional population (7.2%). Pedestrians in this age group were most frequently involved in a collision as the result of entering the roadway unexpectedly; that is, running into the roadway or entering the roadway from behind a parked vehicle or object.

* Vehicle defects were reported in 1 percent of the vehicles involved in collisions. It should be noted that the presence of a recorded vehicle defect does not necessarily suggest that it was the proximate cause of the collision.

1984 COMPARED WITH PREVIOUS YEARS

A comparison of the collision statistics for 1984 with those for previous years indicates noticable differences in four areas as follows.

1. Overall Collisions

Forty fewer collisions (0.6%) occurred in 1984 than in 1983. The number of vehicle collisions occurring in the Regional Municipality of Hamilton-Wentworth was the lowest recorded for the Region since the Region was formed in 1974. Consistent with this reduction in collisions, the occurrence of injury collisions, persons injured and fatalities in the Region were all lower by between 4.0 percent and 10.0 percent compared to 1982.

2. Bicycle Injuries

The number of people injured in motor vehicle collisions while riding on a bicycle dropped from 202 in 1983, to 178 in 1984. For the years 1979, 1980, 1981 and 1982, by comparison, the number of cyclists involved in collisions was 190, 182, 165 and 254 respectively.

3. Pedestrian Collisions Involving Five to Nine Year Olds

Collisions involving five to nine year old pedestrians declined from 79 in 1983 to 51 in 1984, a decrease of thirty-five percent. For comparison, data for the years 1979 through 1982 were 92 collisions, 90 collisions, 72 collisions and 107 collisions respectively.

4. Sixteen to Nineteen Year Old Involvement

The 16 - 19 year old age group of drivers is much less likely to be driving properly when involved in a collision than the overall average. However, in 1984, this age group was involved in fewer collisions per capita than in 1983 and was no more likely to be involved in a collision than the 20 - 24 year old group.

In 1984, sixteen to nineteen year old drivers were involved in fewer motor vehicle collisions following the consumption of alcohol than in 1983. However, collisions involving 16 year olds who had been drinking rose from 1 to 2, and collisions involving 17 year olds who had been drinking rose from 3 to 10.

Chapter One

Trends

General

Since 1951, the number of motor vehicle collisions and persons injured in motor vehicle collisions in Hamilton and Hamilton-Wentworth has increased (Exhibits 1-4, 1-5, 1-6). However, in the same time period, the population of the reporting area has approximately doubled and motor vehicle registrations have risen by a factor of 3 (Appendix Exhibit A-4). There is also evidence to suggest that, with an improving highway system, each registered vehicle is driven a greater distance annually. The effect of increased population, vehicle registration and vehicle use is increased opportunity for motor vehicle collisions to occur.

Normalizing the Data

To fairly assess historical trends, collision data should be expressed in terms of rate (normalized) through the use of one of several factors. Annual motor vehicle use information would provide the most accurate assessment of a motorist's exposure, and hence, likelihood of involvement in a collision. Motor vehicle registration data is somewhat less accurate as a normalizing factor, but is utilized since exposure information is not available. Rates based on registration data should be examined with caution, as the reliability of the registration information is unknown.

Population also provides a suitable and accurate normalizing factor. Exhibits 1-1, 1-2, 1-3 and associated analysis in this chapter refer to data which has been calculated on a population rate basis.

Collisions

The overall motor vehicle collision rate is shown in Exhibit 1-1. As of January 1, 1978, the reporting level for property damage only collisions was raised from \$200.00 to \$400.00. In 1984 the overall number of collisions was approximately .6 percent lower than in 1983.

Due to changes in the reporting criteria and reporting area for the period for which historical data are available, trend analysis of the number of collisions would not be appropriate or meaningful.

Personal injury collisions (Exhibit 1-1) show a significant (at the 99 percent level) decline from 1965 to 1984.

The results of this regression analysis and others for data in this chapter are included in Appendix Exhibit A-7.

Injuries

The personal injury rate graph (Exhibit 1-2), parallels the closely related injury collision graph (Exhibit 1-1). From 1951 to 1984 a significant increase in the personal injury rate is noted, while from 1963 to 1984 a slight decrease (statistically significant at the 95 percent level) is shown.

The rate of occurrence of pedestrian injuries (Exhibit 1-2) has demonstrated a modest but consistent decrease from 1951 to 1984.

Fatalities

In 1984, eighteen persons died in motor vehicle collisions in Hamilton-Wentworth.

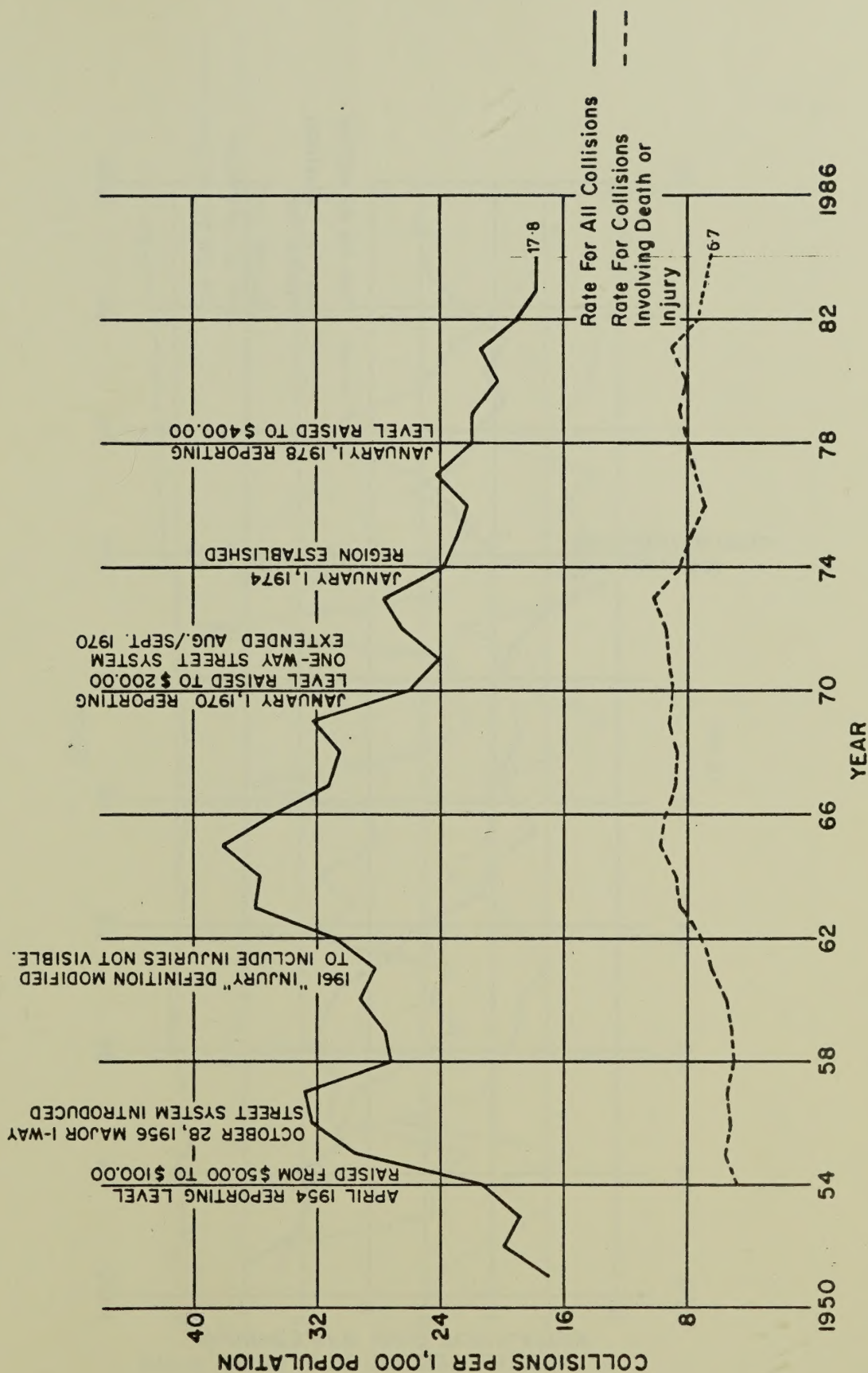
Since fatal collisions are rare events, small changes in the number of fatalities cause large fluctuations in the fatality rate (Exhibit 1-3). These fluctuations reduce the validity of statistical tests. Thus while the fatality rate for all collisions shows a slight downward trend, especially since 1968, this trend is not statistically significant. The overall fatality rate thus appears unchanged during the past 31 years. Comparable patterns are evident for Ontario and Canada (Appendix Exhibit A-5).

The fatality rate for pedestrians does display a reduction which is significant over the last 31 years.

Alcohol Involvement

When viewed as a proportion of overall collisions, statistics pertaining to alcohol involvement have remained quite constant over the period 1977 - 1984. The percentage of collisions in which one or more drivers was reported to have consumed alcohol has averaged approximately 12 percent. Nearly 22 percent of fatal collisions over the eight year period involved a drinking driver. The proportion of all drivers who had been drinking or were impaired when involved in a collision has dropped from 8.3 percent in 1978 to 6.3 percent in 1984 (see Exhibit 3-6). In 1984, 16 - 20 year olds comprised 10.0 percent of the Hamilton-Wentworth population and were involved in approximately 15 percent of collisions after consuming alcohol.

Exhibit 1-1
TRAFFIC COLLISION RATES - 1951 TO DATE
PERSONAL INJURY COLLISION RATES - 1954 TO DATE



PERSONAL INJURY RATES IN TRAFFIC COLLISIONS
1951 TO DATE

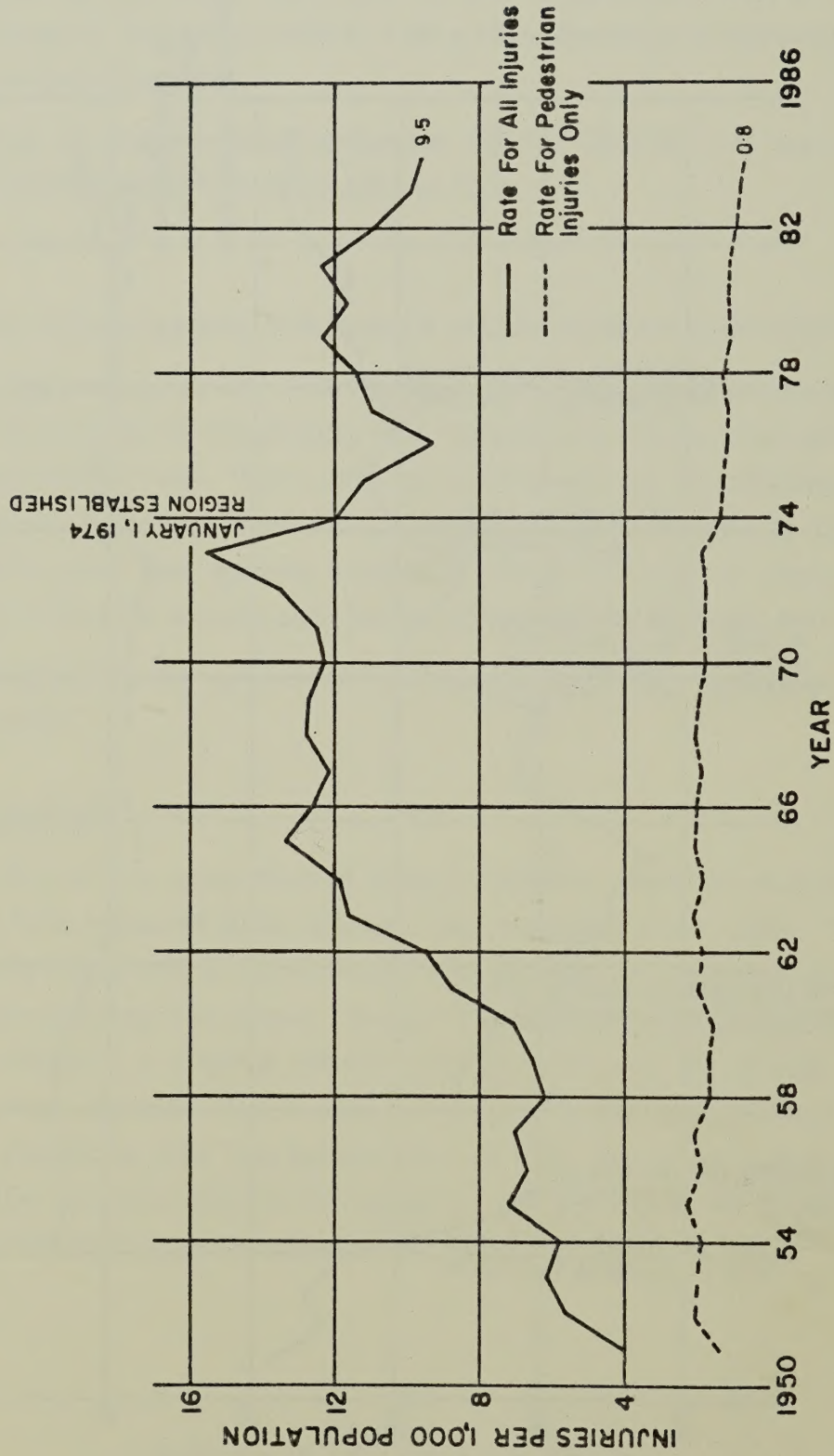


Exhibit 1-3
FATALITY RATES IN TRAFFIC COLLISIONS - 1951 TO DATE

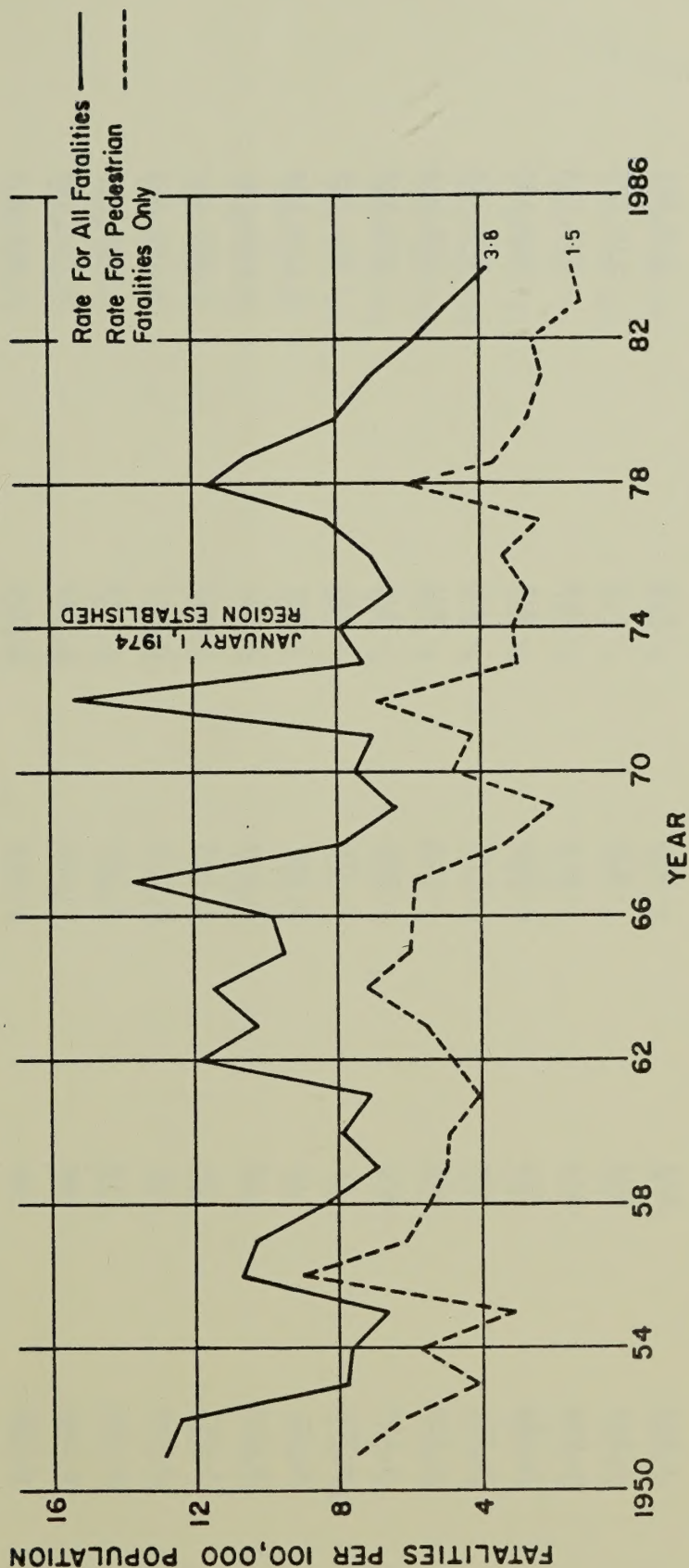


Exhibit 1-4

COLLISION STATISTICS - HISTORIC TRENDS

Year	Total No. of Collisions	Fatal Collisions	Injury Collisions	Property Damage Collisions	Estimated Total Property Damage (\$)
1947	1,052	N/A	N/A	N/A	209,965
1948	1,351	N/A	N/A	N/A	312,170
1949	1,745	N/A	N/A	N/A	378,235
1950	2,304	N/A	N/A	N/A	522,535
1951	3,421	N/A	N/A	N/A	752,185
1952	4,219	N/A	N/A	N/A	892,329
1953	4,114	N/A	N/A	N/A	974,290
1954(a)	4,787	16	1,070	3,701	841,762
1955	6,691	13	1,297	5,381	1,014,339
1956	7,528	25	1,222	6,281	1,169,797
1957	7,973	25	1,376	6,572	1,382,399
1958	6,898	21	1,260	5,617	1,274,017
1959	7,189	18	1,337	5,834	1,388,015
1960	7,763	20	1,496	6,247	1,742,296
1961(a)	7,547	18	1,744	5,785	1,851,000
1962	8,338	28	1,904	6,406	2,160,000
1963	9,554	27	2,309	7,218	2,560,000

1964	9,948	32	2,455	7,461	2,886,000
1965	10,783	26	2,789	7,968	3,413,000
1966	9,950	27	2,757	7,166	3,521,000
1967	9,106	35	2,575	6,496	3,327,000
1968	8,983	21	2,547	6,415	4,449,000
1969	9,589	19	2,721	6,849	3,999,000
1970(a)	7,799	23	2,676	5,100	3,918,000
1971	7,314	22	2,821	4,471	4,647,000
1972	8,065	39	2,901	5,125	5,464,000
1973	8,499	23	3,143	5,333	6,208,000
1974(b)	9,599	29	3,364	6,206	7,886,000
1975	9,354	24	3,219	6,111	8,243,000
1976	9,146	28	2,816	6,302	9,262,000
1977	10,011	33	3,182	6,796	10,514,000
1978(a)	8,636	45	3,246	5,345	12,064,000
1979	8,798	39	3,389	5,370	13,325,000
1980	8,305	33	3,253	5,019	13,708,000
1981	8,660	28	3,398	5,234	15,536,040
1982	7,663	23	2,939	4,701	13,750,100
1983	7,268	20	2,839	4,409	13,924,500
1984	7,228	18	2,726	4,484	14,494,300

(a) Collision reporting criteria changed (See Page 4).

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit 1-5

PERSONAL INJURIES AND FATALITIES - HISTORIC TRENDS

Year	Total No. of Collisions	Persons Injured	Injury Rate/ 1,000 Pop.	Persons Killed	Death Rate/ 100,000 Pop.	Death Rate/ 10,000 Registered Vehicles
1947	1,052	563	N/A	26	N/A	N/A
1948	1,351	671	N/A	19	N/A	5.34
1949	1,745	738	N/A	29	N/A	N/A
1950	2,304	760	N/A	12	N/A	2.55
1951	3,421	815	4.0	26	12.9	5.13
1952	4,219	1,174	5.6	26	12.4	4.71
1953	4,114	1,322	6.1	17	7.8	2.84
1954(a)	4,787	1,304	5.8	17	7.6	2.71
1955	6,691	1,618	7.2	15	6.6	2.22
1956	7,528	1,570	6.7	25	10.7	3.57
1957	7,978	1,703	7.0	25	10.3	3.46
1958	6,898	1,573	6.2	21	8.4	2.77
1959	7,189	1,671	6.5	18	6.9	2.24
1960	7,763	1,871	7.1	21	7.9	2.54
1961(a)	7,547	2,311	8.7	19	7.1	2.22
1962	8,338	2,542	9.5	32	11.9	3.82
1963	9,554	3,075	11.6	27	10.2	3.03

1964	9,948	3,305	11.9	32	11.5	3.43
1965	10,783	3,824	13.4	27	9.5	2.64
1966	9,950	3,746	12.6	28	9.8	2.60
1967	9,106	3,484	12.2	39	13.7	3.63
1968	8,983	3,573	12.8	22	7.9	1.89
1969	9,589	3,768	12.7	19	6.4	1.64
1970(a)	6,759	3,717	12.3	23	7.5	2.00
1971	7,314	3,876	12.5	23	7.0	1.91
1972	8,065	4,055	13.5	46	15.3	3.42 (b)
1973	8,499	4,951	15.5	23	7.2	1.63
1974(c)	9,599	4,678	11.9	31	7.9	2.00 (b)
1975	9,354	4,474	11.2	26	6.5	1.60 (b)
1976	9,146	3,811	9.3	29	7.1	1.78 (b)
1977	10,011	4,513	11.0	34	8.3	2.00 (b)
1978(a)	8,636	4,635	11.4	47	11.6	2.06 (d)
1979	8,798	4,923	12.1	42	10.3	2.20 (d)
1980	8,305	4,800	11.7	33	8.0	1.43 (d)
1981	8,660	5,015	12.3	31	7.6	1.16 (d)
1982	7,663	4,175	10.3	27	6.6	0.91
1983	7,268	4,041	9.9	20	4.9	N/A
1984	7,228	3,855	9.5	18	3.8	N/A

(a) Collision reporting criteria changed (See Page 4).

(b) Registration estimated from total Ontario registrations.

(c) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

(d) Registration data from licence information.

Exhibit 1-6

COLLISIONS WITH ALCOHOL INVOLVEMENT HISTORIC TRENDS

<u>Year</u>	<u>Total Number of Reported Collisions</u>	<u>Number of Alcohol- Related Motor Vehicle Collisions (a)</u>	<u>% Alcohol- Related</u>	<u>Total Number of Fatal Collisions</u>	<u>Total Number of Fatalities</u>	<u>Number of Alcohol- Related Motor Vehicle Fatal Collisions (a)</u>
1977	10,011	1,175	11.7	33	34	5
1978	8,636	1,128	13.1	45	47	11
1979	8,798	1,139	12.9	39	42	5
1980	8,305	929	11.2	33	33	11
1981	8,660	1,053	12.2	28	31	8
1982	7,663	895	11.7	23	27	3
1983	7,268	765	10.5	20	20	5
1984	7,228	729	10.1	18	18	5
TOTAL 1977- 1984	66,569	7,813	11.7	239	252	53

- (a) Includes drivers classified as impaired due to alcohol or classified as had been drinking.
- (b) Section of Canadian Criminal Code.

<u>Number of Drivers Impaired or Had Been Drinking</u>	<u>Number of Drivers Under 21 Years of Age Impaired or Had Been Drinking</u>	<u>% Under 21 Years of Age</u>	<u>Number of Charges Under Sections 234, 235, 236, 237 C.C.(b)</u>	<u>Number of Charges Under Sections 234-237 C.C. To Drivers Under 21 Years of Age</u>	<u>% Under 21 Years of Age</u>	<u>Year</u>
1,179	241	20.4	364	54	14.8	1977
1,169	258	22.1	379	53	14.0	1978
1,194	264	22.1	382	59	15.4	1979
953	178	18.7	303	56	18.5	1980
1,269	208	16.4	369	49	13.3	1981
918	174	19.0	319	49	15.4	1982
775	144	18.6	241	35	14.5	1983
741	111	15.0	308	29	9.4	1984
8,198	1,578	19.2	2,665	384	14.4	TOTAL 1977- 1984

Exhibit 1-7

PEDESTRIAN AND CYCLIST INJURIES HISTORIC TRENDS

YEAR	PEDESTRIAN		BICYCLIST	
	Injuries	Fatalities	Injuries	Fatalities
1947	141	21	N/A	N/A
1948	204	13	N/A	N/A
1949	271	18	43	-
1950	239	11	69	1
1951	284	15	89	-
1952	448	13	116	1
1953	464	9	113	1
1954	439	13	129	1
1955	517	7	141	1
1956	447	21	123	1
1957	526	15	124	2
1958	446	14	100	2
1959	456	13	120	1
1960	422	13	120	2
1961	522	11	112	1
1962	495	13	126	1
1963	558	15	120	1
1964	526	20	120	-
1965	582	17	140	-
1966	618	17	132	1
1967	537	17	113	-
1968	588	10	84	1
1969	602	6	91	2
1970	586	14	101	1
1971	570	13	155	2
1972	530	21	156	2
1973	569	9	197	1
1974 ^(a)	555	13	192	3
1975	513	11	235	-
1976	480	14	195	-
1977	503	10	193	3
1978	542	25	162	1
1979	464	15	177	4
1980	434	12	178	1
1981	458	10	159	1
1982	396	10	252	2
1983	387	5	200	2
1984	314	6	175	1

(a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Chapter Two

Selected Characteristics

Injuries

Of the 20,475 persons involved in collisions, 3,855 received injuries. The chance of an involved person sustaining an injury in a collision varied from a 16 percent chance for a motor vehicle rider or passenger to a 100 percent chance for a pedestrian (Exhibit 2-1). Although the risk of injury would appear to be significantly higher for motorcyclists, bicyclists and pedestrians, this phenomenon is partially or wholly explained by the reporting criteria. It is unlikely that a cyclist or pedestrian would be involved in a collision that resulted in over \$400.00 damage without the cyclist or pedestrian being injured. Small or exposed vehicles such as bicycles also afford less protection in a collision.

Seatbelts

Although motor vehicle seatbelts were reported as being in use for 92 percent of involved drivers (Exhibit 2-2), field observations taken by the Province of Ontario in 1978 (2.1) suggest an actual usage rate for drivers in the order of 65 percent. This discrepancy could be interpreted to mean that a higher proportion of seatbelt users were involved in collisions, but is more likely to indicate an over-statement of seatbelt usage by persons involved in collisions. The involved individual may be concerned about receiving a summons for failure to wear his or her seatbelt or may be concerned about additional financial or civil responsibilities caused by failure to wear belts at the time of the collision.

Motorcycle Injuries

Eighty-seven percent of motorcyclists involved in collisions received injuries, compared to 19 percent of all persons involved in collisions. This is indicative of the limited protection afforded to motorcycle riders involved in a collision.

Fifty-seven of 262 (22%) motorcyclists involved in collisions were reported as not wearing helmets, despite the Provincial law mandating helmet use (Exhibit 2-3).

Helmet use did not appear to have an effect on the likelihood of a motorcyclist being injured in a collision. Helmets are intended to prevent head injury, but in a serious collision, the motorcycle rider is equally likely to receive injuries to other parts of the body.

Damages

Total damages in collisions in Hamilton-Wentworth amounted to a sum of approximately 14.5 million dollars (Exhibit 2-4), which includes damage to vehicles and property but does not include medical and hospital expenses, loss of income, or loss of future earnings. The estimated cost of property damage of each collision was \$2,005 with 56 percent of the vehicles involved sustaining damage in excess of \$600 (Exhibit 2-5). When the costs of medical attention, lost income and other effects are considered, the total cost of each collision may exceed \$5,947 (2.3).

Times of Occurrence

A close similarity between the occurrence of collisions and traffic volumes, on a time of day basis (Exhibit 2-6), was observed. However, the collision rate (in terms of traffic volume) was greater than the daily average during the period from midnight to 5 a.m., when 671 or 9.3 percent of all collisions occurred.

The pattern of collision occurrences by time of day and day of week was summarized (Exhibit 2-7 and Exhibit 2-8), and distinct differences were found in the pattern of collision occurrence.

The explanation for variations in patterns of collisions by time of day and day of week may be associated with difference in travel patterns which change during the week due to the frequency of shopping or personal trips, or with psychological factors such as different drinking and stress patterns that might influence collision involvement.

The pattern of collision occurrences was compared on a month of year basis (Exhibit 2-9) and there was a difference between the number of collisions which occurred each month. The higher number of collisions occurring during the winter months is probably primarily due to drivers not adjusting to adverse weather and roadway conditions.

Impact Types

The type of initial impact was compared with the injury classification of the collisions (Exhibit 2-10) and it was determined (at the 95 percent level) that the probability of injury was not the same for all initial impact types.

The chance of being injured in an approaching or single motor vehicle collision was 44 to 55 percent compared to a 15 to 48 percent chance for other collision types. However, fewer approaching and single motor vehicle collisions resulted in injuries or fatalities (775 versus 1,969) than other collision types.

Impact Types (Cont'd)

Greater than one half of all collisions were in intersections or associated with intersections (Exhibit 2-11). Twenty-six percent of collisions occurred at signalized intersections, and 22 percent at stop- or yield-controlled intersections (Exhibit 2-12).

Over one half of all collisions occurred at locations with no form of traffic control.

REFERENCES

- 2.1 Based on surveys conducted by the Ministry of Transportation and Communications of Ontario, July 1978.
- 2.2 Ontario Ministry of Health: The cost of hospital and medical treatment for a person injured while wearing seatbelts is \$282; for those not wearing belts, \$419.
- 2.3 J. J. Lawson, in "The Cost of Road Accidents and Their Application in Economic Evaluation of Safety Programs" estimated that, in 1978, the average cost of a motor vehicle collision was \$4,500.00 for the direct costs of property damage, lost productive work and health care costs only. The 1978 cost was adjusted to \$3,593.00 to more accurately reflect the severity and type of collisions which occur in Hamilton-Wentworth. Based on the Consumer Price Index, the comparable value for 1984 is \$5,947.00 per collision.

Exhibit 2-1

INJURY STATUS OF ALL PERSONS INVOLVED

Category	Persons Involved	Persons Injured or Killed	Injuries/ Involved	Fatal	TYPE OF INJURY		
					Major	Minor	Minimal
Driver	12,196	2,109	0.17	9	121	707	1,272
Bicyclist	178	176	0.99	1	18	61	96
Rider/Passenger	7,781	1,250	0.16	2	63	425	760
Pedestrian	320	320	1.00	6	46	155	113
Totals	20,475	3,855	0.19	18	248	1,348	2,241

THERE WAS APPROXIMATELY A 2 IN 10 CHANCE
THAT A PERSON INVOLVED IN A TRAFFIC
COLLISION WOULD BE INJURED.

FOR EVERY 20 RESIDENTS OF THE REGIONAL
MUNICIPALITY OF HAMILTON-WENTWORTH,
APPROXIMATELY 1 PERSON WAS INVOLVED IN A
MOTOR VEHICLE COLLISION IN 1984.

Exhibit 2-2

DRIVER INJURY STATUS VS SAFETY EQUIPMENT IN USE

Driver Injury Status	SAFETY EQUIPMENT IN USE				
	All	Pelvic Only	None	Unknown	Total
None	9,251	120	322	419	10,112
Minimal	1,149	21	77	29	1,276
Minor	589	4	78	38	709
Major	73	-	20	28	121
Fatal	4	-	-	5	9
Total	11,066	145	497	519	12,227

DRIVERS WHOSE SEAT BELT USAGE
WAS RECORDED. 12,227

TOTAL DRIVERS WEARING PELVIC
AND/OR SHOULDER BELTS 11,211

RECORDED DRIVER BELT USAGE 91.7%

THE REPORTED SEAT BELT USAGE RATE FOR DRIVERS
INVOLVED IN COLLISIONS WAS 92%

Exhibit 2-3

MOTORCYCLE DRIVER INJURIES

<u>Injury</u>	<u>Helmet in Use</u>				<u>Total</u>
	<u>Yes</u>		<u>No</u>	<u>Not Known</u>	
None	27	(79.4) (a)	7	1	35
Minimal	61	(80.3)	15	-	76
Minor	80	(75.5)	26	2	108
Major	24	(72.7)	9	1	34
Fatal	4	(100.0)	-	-	4
Unknown	-	(-)	-	5	5
Totals	196	(77.5)	57	9	262

87% OF MOTORCYCLE DRIVERS INVOLVED IN COLLISIONS FOR WHICH INJURY STATUS WAS RECORDED RECEIVED INJURIES. THE LIKELIHOOD OF INJURY WAS SIMILAR FOR HELMET USERS AND NON USERS (HELMETS OFFER PROTECTION ONLY FOR HEAD AND NECK INJURIES).

23% OF MOTORCYCLISTS INVOLVED IN COLLISIONS WERE RECORDED AS NOT WEARING SAFETY HELMETS.

(a) Numbers in brackets are percentages of row totals. Percentages exclude unknown helmet use.

Exhibit 2-4

PROPERTY DAMAGE ESTIMATES (a)

	<u>Total</u>	<u>Average per Collision</u>
Damage to Vehicles	\$13,944,800.	\$1,936.
Damage to Other Property	499,500.	69.
All Damage	14,494,300.	2,005.

THE AVERAGE DAMAGE FOR EACH REPORTED
COLLISION WAS \$2,005.

Exhibit 2-5 ESTIMATED DAMAGE TO MOTOR VEHICLES (a)

<u>Damage</u>	<u>No. of Vehicles</u>	<u>% Of All Vehicles Involved</u>
None	618	8.6
\$0 - 199	624	8.6
\$200 - 399	784	10.8
\$400 - 599	1,105	15.3
\$600 - 999	1,271	17.6
\$1,000 - 1,999	1,464	20.3
\$2,000 - 3,999	1,054	14.6
\$4,000 and over	308	4.2
	<u>7,228</u>	<u>100.0</u>

OVER 56% OF THE VEHICLES INVOLVED IN
COLLISIONS EXPERIENCED DAMAGE IN EXCESS
OF \$600.

(a) As estimated at the scene of the collision.

Exhibit 2-6

TIME OF DAY VS COLLISIONS AND TRAFFIC VOLUME

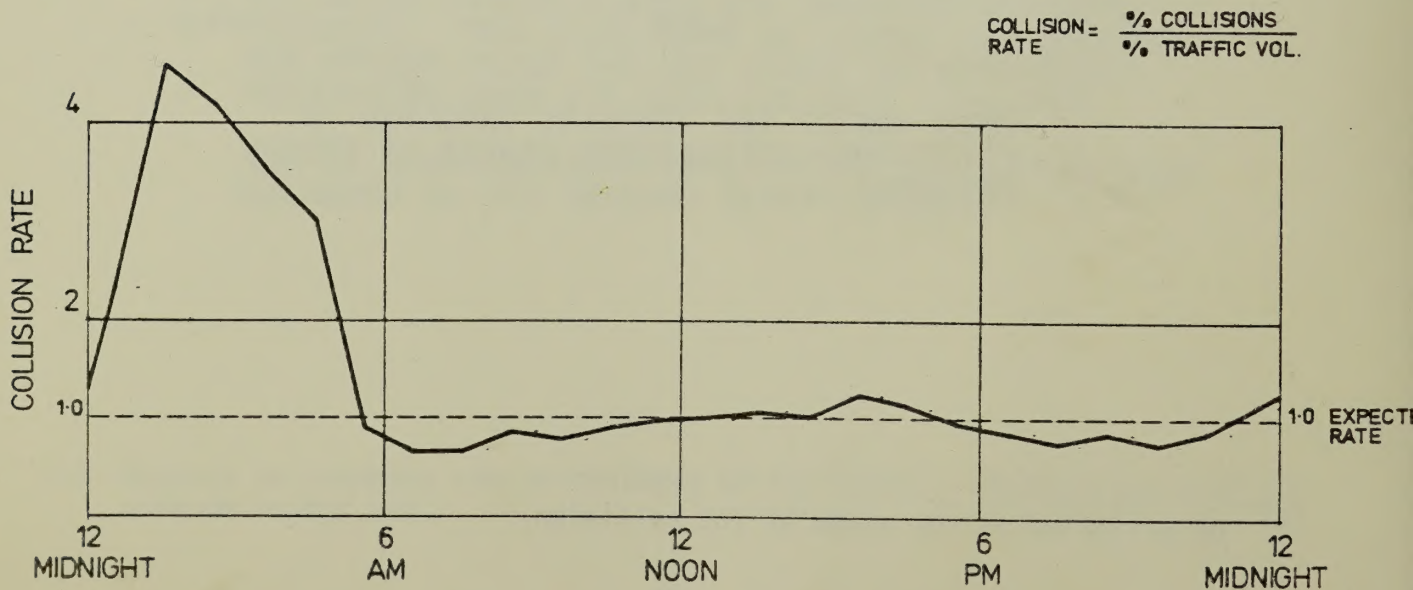
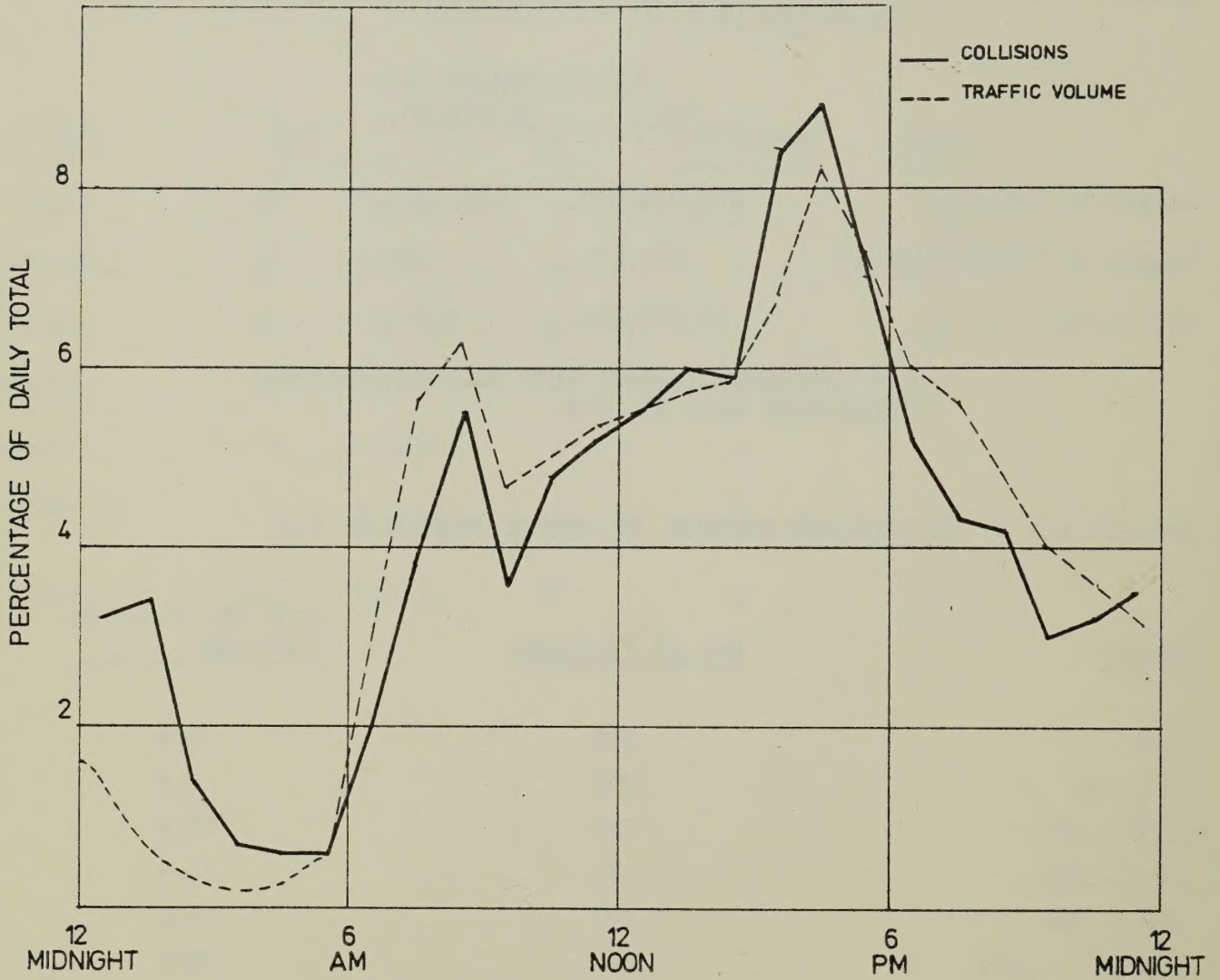


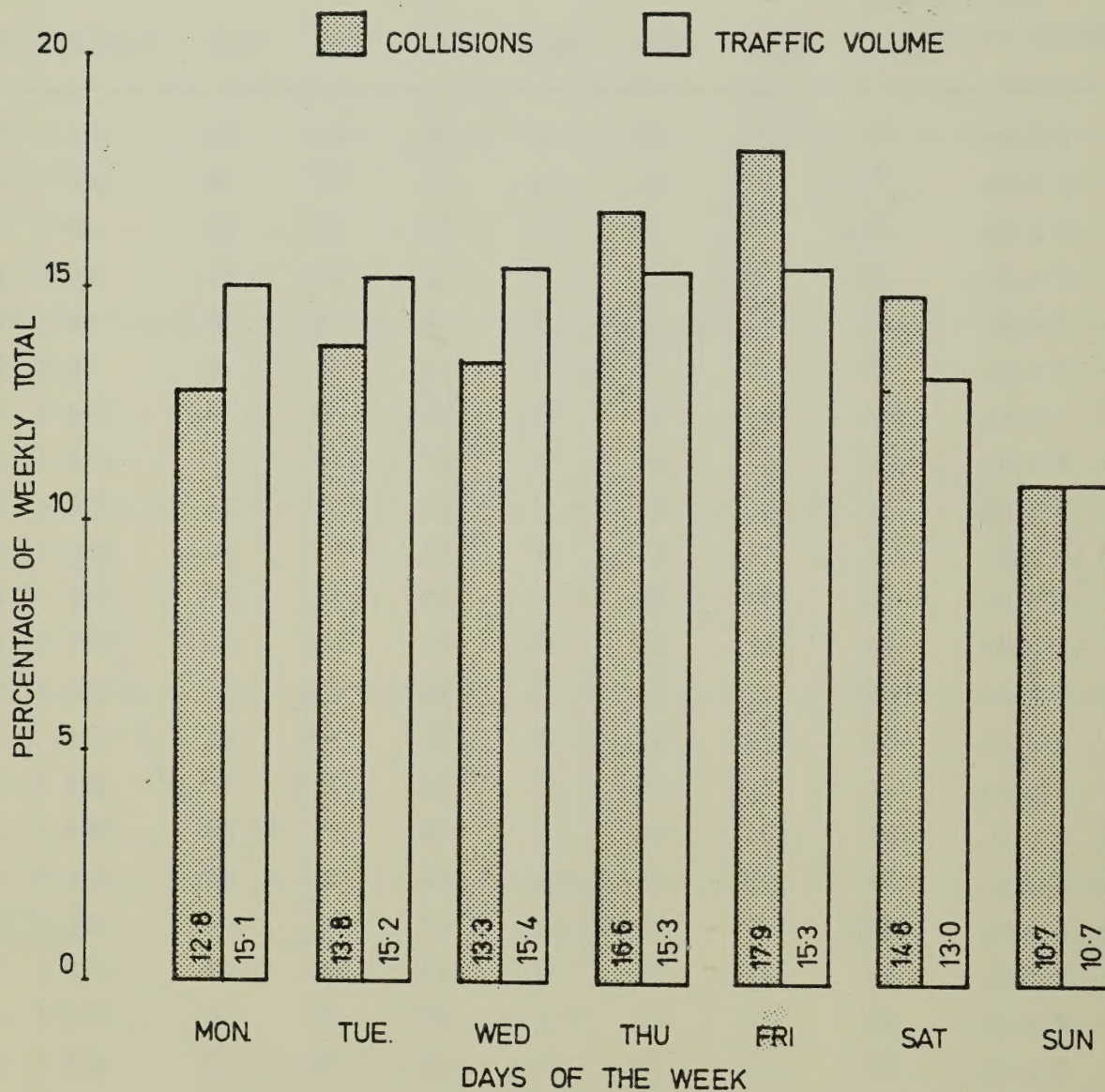
Exhibit 2-7

COLLISION OCCURRENCES BY TIME OF DAY AND DAY OF WEEK

Time	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTALS	(%)
12 - 1 a.m.	20	24	20	29	25	61	49	228	(3.2)
1 - 2 a.m.	5	17	15	24	27	83	78	249	(3.4)
2 - 3 a.m.	2	10	5	8	15	30	28	98	(1.4)
3 - 4 a.m.	4	6	3	3	5	12	21	54	(0.8)
4 - 5 a.m.	2	4	1	3	8	14	10	42	(0.6)
5 - 6 a.m.	2	7	4	5	4	10	8	40	(0.6)
6 - 7 a.m.	20	28	23	29	26	9	9	144	(2.0)
7 - 8 a.m.	48	54	43	55	48	15	15	278	(3.9)
8 - 9 a.m.	65	81	60	87	68	21	14	396	(5.5)
9 - 10 a.m.	37	38	44	46	47	31	19	262	(3.6)
10 - 11 a.m.	47	40	49	45	65	71	27	344	(4.8)
11 - 12 noon	57	62	56	60	56	54	32	377	(5.2)
12 - 1 p.m.	48	72	55	75	56	56	38	400	(5.5)
1 - 2 p.m.	62	53	54	82	75	63	43	432	(6.0)
2 - 3 p.m.	51	52	55	65	83	78	45	429	(5.9)
3 - 4 p.m.	87	100	94	101	106	67	54	609	(8.4)
4 - 5 p.m.	93	99	86	122	122	76	48	646	(8.9)
5 - 6 p.m.	69	65	72	92	97	63	47	505	(7.0)
6 - 7 p.m.	43	45	58	60	73	62	37	378	(5.2)
7 - 8 p.m.	46	39	58	51	60	35	25	314	(4.3)
8 - 9 p.m.	34	28	23	52	67	56	46	306	(4.2)
9 - 10 p.m.	22	27	29	32	54	26	25	215	(3.0)
10 - 11 p.m.	34	17	28	31	60	34	26	230	(3.2)
11 - 12 a.m.	30	30	27	45	49	43	28	252	(3.5)
Totals	928	998	962	1,202	1,296	1,070	772	7,228	(100.0)
%	(12.8)	(13.8)	(13.3)	(16.6)	(17.9)	(14.8)	(10.7)		

THE HIGHEST ONE HOUR COLLISION PERIOD
WAS THURSDAY AND FRIDAY BETWEEN 4 P.M.
AND 5 P.M.

DAY OF WEEK VS COLLISIONS AND TRAFFIC VOLUME



THE HIGHEST COLLISION RATE (a)
OCCURRED ON FRIDAYS

$$(a) \text{ RATE} = \frac{\% \text{ COLLISIONS}}{\% \text{ VOLUME}}$$

Exhibit 2-9

MONTH OF YEAR OF OCCURRENCE OF COLLISIONS

<u>Month</u>	<u>Number of Collisions</u>	<u>Percentage of Total Collisions</u>
January	627	8.7
February	499	6.9
March	641	8.9
April	472	6.5
May	568	7.9
June	610	8.4
July	529	7.3
August	599	8.3
September	655	9.1
October	610	8.4
November	721	10.0
December	697	9.6
	7,228	100.0

THE HIGHEST NUMBER OF COLLISIONS
OCCURRED IN THE MONTH OF NOVEMBER.

Exhibit 2-10

INITIAL IMPACT TYPE VS CLASSIFICATION

Initial Impact Type	Classification				Column A + B Column D
	A Fatal Injury No. %	B Non-Fatal Injury No. %	C Property Damage Only No. %	D All Collisions No. %	
Rear End	- (-)	790 (29.0)	845 (18.8)	1,635 (22.6)	0.48
Angle	6 (33.3)	778 (28.5)	1,522 (33.9)	2,306 (31.9)	0.34
Turning	- (-)	265 (9.7)	737 (16.4)	1,002 (13.9)	0.26
Sideswipe	- (-)	124 (4.5)	683 (15.2)	807 (11.2)	0.15
Approaching	2 (11.1)	106 (3.9)	137 (3.1)	245 (3.4)	0.44
Single Motor Vehicle	10 (55.6)	657 (24.1)	557 (12.4)	1,224 (16.9)	0.55
Other	- (-)	6 (0.2)	3 (0.1)	9 (0.1)	0.67
	18 (100.0)	2,726 (100.0)	4,484 (100.0)	7,228	

55% OF THE INITIAL IMPACTS RECORDED
WERE "ANGLE" AND "REAR END".

THE PROBABILITY OF FATALITY OR OF INJURY
WAS HIGHEST IN REAR END OR SINGLE VEHICLE
COLLISIONS

INITIAL IMPACT TYPE VERSUS ROAD LOCATION

Impact Type	Road Location							Totals
	Non-Intersection	Intersection Related	Intersection In Intersection	At Private Drive	At Railroad	Underpass or Tunnel	Overpass or Bridge	
Rear End	752	545	209	115	7	2	5	1,635
Angle	476	281	1,181	359	6	-	2	2,306
Turning	132	162	549	157	-	1	1	1,002
Sideswipe	505	132	101	60	-	2	7	807
Approaching	136	31	57	16	-	2	2	245
Single Motor Vehicle	753	198	179	67	6	8	13	1,224
Other	6	-	-	3	-	-	-	9
TOTALS	2,760	1,349	2,276	777	19	15	30	7,228
%	(38.2)	(18.7)	(31.5)	(10.7)	(0.3)	(0.2)	(0.4)	(100.0)

50% OF COLLISIONS WERE IN, OR ASSOCIATED WITH INTERSECTIONS

Exhibit 2-12

INITIAL IMPACT TYPE VERSUS TYPE OF TRAFFIC CONTROL

Impact Type	Type of Traffic Control							Totals
	Operating Traffic Signal	Operating Stop Sign	Operating Yield Sign	Police Control	School Guard	School Bus	No Control	
Rear End	499	175	26	1	2	6	921	1,635
Angle	625	786	22	-	-	2	863	2,306
Turning	381	238	4	-	-	-	379	1,002
Sideswipe	147	121	3	-	-	-	533	807
Approaching	42	48	2	-	-	-	153	245
Single Motor Vehicle	197	168	5	-	5	3	840	1,224
Other	1	1	-	-	-	-	7	9
TOTALS	1,892	1,537	62	1	7	11	3,696	7,228
%	(26.2)	(21.3)	(0.9)	(0.0)	(0.1)	(0.2)	(51.0)	(100.0)

GREATER THAN ONE-HALF OF ALL COLLISIONS (51%)
OCCURRED AT LOCATIONS WITH NO TRAFFIC CONTROL.

Chapter Three

Drivers

Driver Age

Although sixteen to nineteen year olds make up only 7 percent of the licenced driving population, this age group was involved in 9.1 percent of reported collisions (Exhibit 3-1).

Drivers under 22 involved in collisions were less likely to have been driving properly at the time of the collision (Exhibit 3-2). Younger drivers involved in collisions were more likely to have committed improper driving actions resulting from poor judgement or lack of maturity. Frequent improper driver actions for this age group were "improper turn", "loss of control of the vehicle", "failure to yield the right-of-way" and "following too close". Drivers over 65 years of age involved in collisions were more likely to have committed infractions involving non-compliance with traffic regulations such as "failure to yield the right-of-way" or "improper turn".

Drinking Drivers

Drinking drivers were involved in 10.1 percent of all reported collisions, 27.8 percent of fatal collisions and 12.6 percent of injury collisions (Exhibit 3-3). There was a 30 percent greater chance of an injury occurring in a collision which involved a driver who had been drinking than in a collision in which all drivers were sober. Drivers reported as impaired had relatively constant probability of involvement in injury-causing or property damage only collisions.

Exhibit 3-4 indicates that 36 percent of the collisions which occurred during the period from 10 p.m. to 3 a.m. from Wednesdays to Sundays involved drinking drivers.

Exhibit 3-5 indicates that less than 15 percent of the drivers involved in collisions who had been drinking or were impaired were driving properly at the time of the collision and the most frequently indicated improper driver action was loss of control of the vehicle.

Eighteen, nineteen, twenty and twenty-one year old age groups had above average likelihood of being under the influence of alcohol at the time of a collision (Exhibit 3-6).

Hit and Run Collisions

In 1984 there were 825 hit and run collisions involving 826 hit and run drivers, of which 42 percent were subsequently apprehended (Exhibit 3-7). The hit and run collision is more likely to be of a "property damage" classification (Exhibit 3-8).

Non-Licensed Drivers

It was determined that the non-licensed driver, including those whose licence was under suspension, was more likely to be involved in a fatal or injury collision (Exhibit 3-9) and also more likely to be under the influence of alcohol at the time of the collision (Exhibit 3-10). The non-licensed driver was also more likely to have been driving too fast for roadway conditions at the time of the collision (Exhibit 3-11).

Exhibit 3-12 indicates that 57 percent of the collisions involving a non-licensed driver occurred between 6 p.m. and 6 a.m. whereas only 33 percent of all collisions occurred during this period. The exhibit also indicates that 78 percent of the alcohol-related collisions occurred during this period. The 6 p.m. to 6 a.m. period is characterized by high alcohol involvement, high involvement of non-licensed drivers and high collision involvement rate.

Moving Violations

The Regional Police Department issued over 55,000 moving violation summonses in 1984 and this effort at reducing traffic collisions by selective enforcement is recognized. However, it was determined that, in many cases, enforcement was directed at violations that do not relate proportionately to violations indicated in traffic collisions. This could indicate that the enforcement effort is very successful in that it eliminates collisions of related types. However, this may be an indication that a portion of the enforcement effort is directed at moving violations that are readily enforceable (Exhibit 3-13). It is recognized that some violations involved in collisions are difficult to enforce or represent an unfeasible countermeasure to collision occurrences. For example, "following too close" was indicated in 17.2 percent of the improper driving actions and "failure to yield the right-of-way" was indicated in 23.7 percent of improper driving actions. The former is difficult to enforce in the absence of a collision, and it is unfeasible to enforce the latter. Selective enforcement nonetheless is a recognized collision countermeasure technique for other types of moving violations.

Motorcycles

The proportion of motorcycle drivers involved in collisions driving properly in most age groups is higher than the proportion for other motor vehicle drivers for the same age groups (Exhibit 3-14). This exhibit also indicates that the most frequent improper driver action for motorcyclists was "lost control".

Motorcycles (Cont'd)

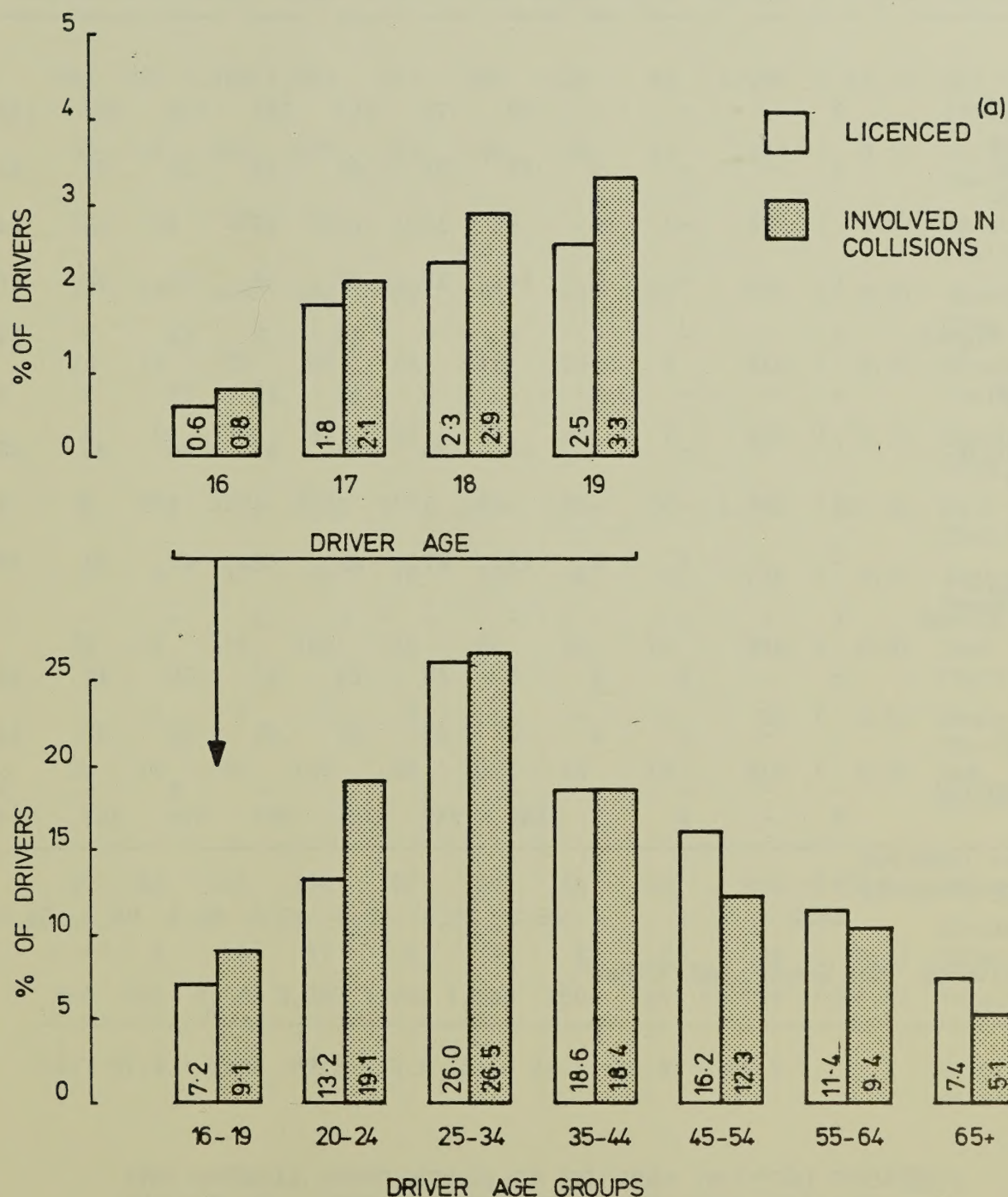
Without more refined data on exposure of motorcyclists in traffic under non-collision circumstances, the significance of a higher proportion of involved motorcycle drivers driving properly in a collision cannot be specifically determined. It could be hypothesized that a motorcycle operator is particularly prone to being involved in a collision when driving properly or alternatively, that the motorcycle operator is particularly adept in avoiding a collision for which he or she would have been responsible.

Bicycles

It was determined that responsibility for a collision involving a bicyclist decreased with increased bicyclist age and that 30 percent or less of bicyclists under 15 involved in collisions were recorded as driving properly (Exhibit 3-15). The most predominant known cyclist improper action indicated was "failure to yield the right-of-way" but instances of disobeying other traffic laws were also prominent.

Exhibit 3-1

LICENCED MOTOR VEHICLE DRIVER AGE VS COLLISION INVOLVEMENT



16 TO 24 YEAR OLD DRIVERS WERE INVOLVED IN MORE COLLISIONS PER LICENCED DRIVER THAN ANY OTHER AGE GROUP.

(a) Licenced in the Province of Ontario.

Exhibit 3-2

MOTOR VEHICLE DRIVER AGE VS DRIVER ACTION

Driver Action	0-4	5-9	10-14	15	16	17	18	19	20	21	22
Driving Properly	2	-	-	-	30	76	114	165	206	207	180
Following Too Close	1	-	-	-	17	21	41	48	50	61	41
Speed Too Fast	-	-	-	-	5	11	12	18	8	16	14
Improper Turn	1	-	-	-	14	19	27	18	26	32	13
Disobey Traffic Signal	1	-	-	-	1	7	14	3	10	9	13
Disobey Stop Sign	-	-	-	-	-	5	14	10	13	5	5
Fail to Yield R.O.W.	1	-	-	1	13	25	38	47	44	43	38
Improper Passing	2	-	-	-	-	2	2	4	3	2	7
Lost Control	-	-	1	2	16	37	45	40	47	44	46
Wrong Way One-Way Street	1	-	-	-	-	-	-	1	-	-	-
Not Known	-	-	1	2	5	18	19	12	30	17	30
Other Disobey	-	-	-	1	8	25	27	41	36	49	34
Other Control	-	-	-	-	-	1	1	-	2	-	2
Totals	9	-	2	7	109	247	354	407	475	485	423
% Drivers involved driving properly ^(a)	22.2	-	-	-	31.3	37.3	37.0	46.6	50.3	49.4	50.1

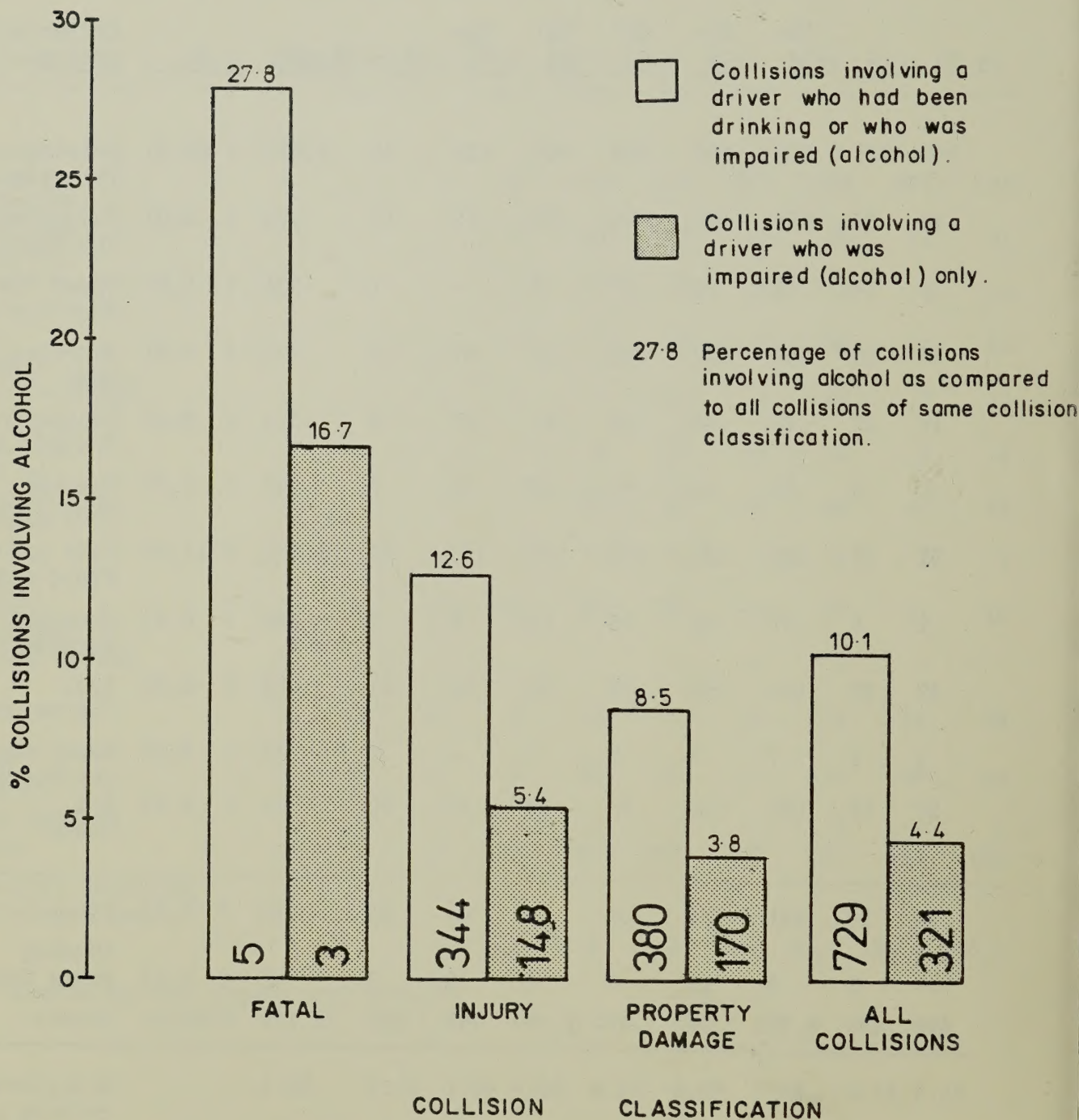
(a) Excluding "Not Known" and "Other".

<u>23</u>	<u>24</u>	<u>25- 34</u>	<u>35- 44</u>	<u>45- 54</u>	<u>55- 64</u>	<u>65- 74</u>	<u>75 +</u>	<u>Totals</u>	<u>%</u>	<u>Driver Action</u>
245	237	1,706	1,203	783	550	180	43	5,927	(48.6)	Driving Properly
46	37	254	170	94	63	19	11	974	(8.0)	Following Too Close
14	14	56	28	18	8	-	1	223	(1.8)	Speed Too Fast
21	18	149	122	100	95	47	14	717	(5.9)	Improper Turn
14	11	78	48	44	42	15	4	314	(2.6)	Disobey Traffic Signal
6	6	53	32	22	19	10	7	207	(1.7)	Disobey Stop Sign
51	47	280	236	175	164	105	34	1,342	(11.0)	Fail to Yield R.O.W.
1	5	27	13	16	10	6	1	101	(0.8)	Improper Passing
40	32	193	109	70	51	20	11	804	(6.6)	Lost Control
2	1	7	3	2	1	-	1	19	(0.2)	Wrong Way One-Way Street
20	19	175	116	69	52	16	10	611	(5.0)	Not Known
30	24	241	158	96	86	44	14	914	(7.5)	Other
-	1	9	11	6	4	6	2	45	(0.4)	Disobey Other Control
490	452	3,228	2,249	1,495	1,145	468	153	12,198	(100.0)	Totals
55.7	57.9	60.7	60.9	58.9	54.6	44.1	33.3	55.5		% Drivers involved driving properly (a)

THE OVERALL PERCENTAGE OF DRIVERS DRIVING PROPERLY WAS 55.5%. THE PERCENTAGE OF DRIVERS DRIVING PROPERLY FOR DRIVER AGE GROUPS UNDER 20 AND OVER 64 WAS LESS THAN 50%.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ACTION WAS FAILING TO YIELD RIGHT-OF-WAY.

ALCOHOL INVOLVEMENT VS COLLISION CLASSIFICATION



COLLISIONS IN WHICH AN INJURY OR FATALITY OCCURRED WERE MORE LIKELY TO INVOLVE A DRIVER WHO HAD BEEN DRINKING THAN PROPERTY DAMAGE ONLY COLLISIONS.

IMPAIRED DRIVERS HAD RELATIVELY HIGHER INVOLVEMENT IN FATAL COLLISIONS.

Exhibit 3-4

**TIME OF DAY AND DAY OF WEEK OF
COLLISIONS INVOLVING ALCOHOL**

Time of Day	MON	TUES	WED	THUR	FRI	SAT	SUN	TOTAL
12 - 1 a.m.	2	3	4	8	9	22	17	65
1 - 2 a.m.	1	6	7	11	14	47	35	121
2 - 3 a.m.	2	4	-	3	5	16	13	43
3 - 4 a.m.	1	3	1	-	4	3	8	20
4 - 5 a.m.	-	1	-	-	4	2	3	10
5 - 6 a.m.	-	1	1	-	2	4	1	9
6 - 7 a.m.	-	1	1	-	-	1	2	5
7 - 8 a.m.	-	-	1	1	-	3	3	8
8 - 9 a.m.	-	-	-	-	-	2	1	3
9 - 10 a.m.	-	-	4	-	-	-	3	7
10 - 11 a.m.	1	-	1	-	-	2	-	4
11 - 12 noon	-	1	1	2	-	2	-	6
12 - 1 p.m.	2	1	-	1	1	2	-	7
1 - 2 p.m.	2	-	1	2	2	3	1	11
2 - 3 p.m.	2	-	1	2	1	2	3	11
3 - 4 p.m.	6	2	2	3	2	5	6	26
4 - 5 p.m.	2	4	5	1	3	10	5	30
5 - 6 p.m.	5	3	5	3	10	10	8	44
6 - 7 p.m.	6	3	4	5	6	10	3	37
7 - 8 p.m.	1	5	4	4	8	9	2	33
8 - 9 p.m.	7	8	5	9	9	12	8	58
9 - 10 p.m.	5	5	7	6	16	9	3	51
10 - 11 p.m.	5	3	6	14	11	9	11	59
11 - 12 midnight	1	7	5	11	17	11	9	61
Totals	51	61	66	86	124	196	145	729

**36% OF THE COLLISIONS WHICH OCCURRED DURING
THE PERIOD FROM 10:00 P.M. TO 3:00 A.M.,
WEDNESDAYS TO SUNDAYS INVOLVED ALCOHOL.**

**11% OF ALL ALCOHOL RELATED COLLISIONS
OCCURRED BETWEEN 1:00 A.M. AND 2:00 A.M. ON
SATURDAYS AND SUNDAYS.**

**10.1% OF ALL COLLISIONS INVOLVED ONE OR MORE
DRIVERS WHO HAD BEEN DRINKING.**

Exhibit 3-5

DRIVER ACTION VS DRIVER CONDITION

	<u>Normal</u>	<u>Had Been Drinking</u>	<u>Impaired- Alcohol</u>	<u>Impaired- Drugs</u>	<u>Fatigue</u>
Driving Properly	5,818	58	6	-	-
Following Too Close	894	32	19	-	-
Speed Too Fast	144	40	31	-	1
Improper Turn	664	19	12	1	-
Disobey Traffic Signal	286	13	9	-	-
Disobey Stop Sign	185	6	7	1	-
Fail to Yield Right-of-Way	1,267	30	16	-	1
Improper Passing	88	4	6	-	-
Lost Control	503	128	95	2	6
Wrong Way on One-Way Street	14	1	4	-	-
Not Known	351	26	29	-	-
Other	711	60	84	2	10
Disobey Other Control	37	3	3	1	-
Totals	10,962	420	321	7	18
% Drivers involved driving properly ^(a)	58.8	17.4	2.9	-	-

(a) Excluding not known and other.

<u>Medical Defect</u>	<u>Not Known</u>	<u>Other</u>	<u>Totals</u>	<u>(%)</u>	
2	43	-	5,927	(48.6)	Driving Properly
3	26	-	974	(8.0)	Following Too Close
-	7	-	223	(1.8)	Speed Too Fast
-	20	1	717	(5.9)	Improper Turn
-	6	-	314	(2.6)	Disobey Traffic Signal
-	8	-	207	(1.7)	Disobey Stop Sign
1	27	-	1,342	(11.0)	Fail to Yield Right-of-Way
-	3	-	101	(0.8)	Improper Passing
11	58	1	804	(6.6)	Lost Control
-	-	-	19	(0.2)	Wrong Way on One-Way Street
2	203	-	611	(5.0)	Not Known
6	40	1	914	(7.5)	Other
-	1	-	45	(0.4)	Disobey Other Control
25	442	3	12,198	(100.0)	Totals
11.8	21.6	-	55.5		% Drivers involved driving properly ^(a)

LESS THAN 15% OF DRIVERS WHO HAD BEEN DRINKING OR WERE IMPAIRED WERE RECORDED AS DRIVING PROPERLY AT THE TIME OF THE COLLISION.

Exhibit 3-6

MOTOR VEHICLE DRIVER AGE VS DRIVER CONDITION

Driver Condition	0 - 4	5 - 9	10- 14	15	16	17	18	19	20	21
Normal	8	-	2	2	99	223	310	363	411	422
Had Been Drinking	-	-	-	-	2	10	21	22	29	22
Impaired - Alcohol	1	-	-	-	2	4	4	7	10	20
Impaired - Drugs	-	-	-	-	-	-	-	1	1	-
Fatigue	-	-	-	-	-	-	2	-	2	1
Medical Defect	-	-	-	-	1	-	-	-	-	1
Not Known	-	-	-	5	5	10	17	14	21	19
Other	-	-	-	-	-	-	-	-	1	-
Totals	9	-	2	7	109	247	354	407	475	485

% Drinking
Drivers Involved^(a)

- - - - 3.9 5.9 7.4 7.4 8.6 9.0

(a) Excluding not known and other.

<u>22- 24</u>	<u>25- 34</u>	<u>35- 44</u>	<u>45- 54</u>	<u>55- 64</u>	<u>65- 74</u>	<u>75 +</u>	<u>Total</u>	<u>%</u>	<u>Driver Condition</u>
1,190	2,883	2,035	1,379	1,058	438	139	10,962	89.8	Normal
68	112	63	40	21	6	4	420	3.4	Had Been Drinking
50	96	64	30	24	7	2	321	2.6	Impaired- Alcohol
-	3	1	1	-	-	-	7	0.1	Impaired- Drugs
2	5	2	2	2	-	-	18	0.2	Fatigue
1	6	5	-	8	1	2	25	0.2	Medical Defect
53	123	78	43	32	16	6	442	3.6	Not Known
1	-	1	-	-	-	-	3	0.0	Other
1,365	3,228	2,249	1,495	1,145	468	153	12,198	100.0	Totals
									% Drinking Drivers Involved ^(a)
9.0	6.7	5.9	4.8	4.0	2.9	4.1	6.3		

6.3% OF ALL DRIVERS INVOLVED HAD BEEN DRINKING OR WERE IMPAIRED BY ALCOHOL AT THE TIME OF THE COLLISION.

THE 18, 19, 20 AND 21 YEAR OLD AGE GROUPS HAD ABOVE AVERAGE LIKELIHOODS OF BEING UNDER THE INFLUENCE OF ALCOHOL AT THE TIME OF A COLLISION.

Exhibit 3-7

HIT AND RUN COLLISIONS

HIT AND RUN COLLISIONS	825	
HIT AND RUN DRIVERS (a)	826	
DRIVERS APPREHENDED	347	(42%)

**42% OF HIT AND RUN DRIVERS
WERE SUBSEQUENTLY APPREHENDED.**

Exhibit 3-8

HIT AND RUN COLLISION CLASSIFICATION

COLLISIONS IN WHICH:	<u>FATAL</u>	<u>INJURY</u>	<u>PROPERTY DAMAGE</u>	<u>TOTAL</u>
Driver(s) Apprehended	1	97	249	347
Driver(s) Not Apprehended	-	81	397	478
TOTAL	1 (0%)	178 (21.6%)	646 (78.3%)	825 (100%)

**78.3% OF HIT AND RUN COLLISIONS
INVOLVED PROPERTY DAMAGE ONLY.**

(a) One collision involved two hit and run drivers.

Exhibit 3-9

**LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS
CLASSIFICATION OF COLLISION**

Classification	Non-Licensed		Licensed	
	No.	(% of Non-Licensed)	No.	(% of Licensed)
Fatal	2	(1.2)	24	(0.2)
Injury	65	(40.1)	4,606	(38.3)
Property Damage	95	(58.7)	7,406	(61.5)
Total	162	(100.0)	12,036	(100.0)

**A HIGHER PROBABILITY OF A FATAL OR INJURY
COLLISION IS ASSOCIATED WITH THE INVOLVEMENT
OF A NON-LICENCED DRIVER.**

Exhibit 3-10

LICENCE STATUS OF MOTOR VEHICLE DRIVERS VS DRIVER CONDITION

Driver Condition	Non-Licensed		Licensed	
	No.	(% of Non-Licensed)	No.	(% of Licensed)
Normal	81	(50.0)	10,882	(90.4)
Had Been Drinking	27	(16.7)	393	(3.3)
Impaired - Alcohol	27	(16.7)	294	(2.4)
Impaired - Drugs	1	(0.6)	6	(0.1)
Fatigue	-	(0.0)	18	(0.2)
Medical Defect	1	(0.6)	24	(0.2)
Not Known	25	(15.4)	417	(3.5)
Other	-	(0.0)	3	(0.0)
Total	162	(100.0)	12,037	(100.0)

**A HIGHER PROBABILITY OF ALCOHOL USE WAS ASSOCIATED
WITH THE INVOLVEMENT OF A NON-LICENCED DRIVER.**

**AN UNLICENCED DRIVER INVOLVED IN A COLLISION WAS
OVER FIVE TIMES AS LIKELY TO HAVE BEEN UNDER THE
INFLUENCE OF ALCOHOL OR DRUGS AS A LICENCED
DRIVER.**

Exhibit 3-11

LICENCE STATUS OF MOTOR VEHICLE DRIVER VS DRIVER ACTION

<u>Driver Action</u>	<u>Non-Licensed</u> No. (% of Non-Licensed)		<u>Licensed</u> No. (% of Licensed)	
Driving Properly	28	(17.3)	5,899	(49.0)
Following Too Close	8	(4.9)	966	(8.0)
Speed Too Fast	7	(4.3)	216	(1.8)
Improper Turn	7	(4.3)	710	(5.9)
Disobey Traffic Signal	4	(2.5)	310	(2.6)
Disobey Stop Sign	5	(3.1)	202	(1.7)
Fail to Yield R.O.W.	7	(4.3)	1,335	(11.1)
Improper Passing	3	(1.9)	98	(0.8)
Lost Control	44	(27.2)	759	(6.3)
Wrong Way on One Way Street	1	(0.6)	18	(0.2)
Not Known	21	(13.0)	590	(4.9)
Other	26	(16.1)	888	(7.4)
Disobey Other Control	1	(0.6)	44	(0.4)
Total	162	(100.0)	12,035	(100.0)
% Drivers Driving Properly	(a)	(24.4)		(55.9)

24% OF INVOLVED NON-LICENCED DRIVERS WERE DRIVING PROPERLY COMPARED WITH 56% OF LICENCED DRIVERS.

THE MOST FREQUENT RECORDED IMPROPER DRIVING ACTIONS FOR NON-LICENCED DRIVERS WERE "LOST CONTROL" AND "FOLLOWING TOO CLOSE".

(a) Excluding "Not Known" and "Other".

Exhibit 3-12

**TIME OF DAY VERSUS COLLISIONS
FOR TOTAL COLLISIONS, COLLISIONS
INVOLVING NON-LICENCED DRIVERS AND
COLLISIONS INVOLVING ALCOHOL.**

Time of Day	Collisions Involving Non-Licensed Drivers No.	% of Collisions Involving Alcohol	% of Total Collisions Occurring
12 - 1 a.m.	8	4.9	8.9
1 - 2 a.m.	8	4.9	16.6
2 - 3 a.m.	6	3.7	5.9
3 - 4 a.m.	6	3.7	2.7
4 - 5 a.m.	3	1.8	1.4
5 - 6 a.m.	1	0.6	1.2
6 - 7 a.m.	2	1.2	0.7
7 - 8 a.m.	5	3.0	1.1
8 - 9 a.m.	7	4.3	0.4
9 - 10 a.m.	1	0.6	1.0
10 - 11 a.m.	6	3.7	0.5
11 - 12 noon	4	2.4	0.8
12 - 1 p.m.	7	4.3	1.0
1 - 2 p.m.	5	3.0	1.5
2 - 3 p.m.	7	4.3	1.5
3 - 4 p.m.	9	5.5	3.6
4 - 5 p.m.	14	8.5	4.1
5 - 6 p.m.	4	2.4	6.0
6 - 7 p.m.	12	7.3	5.1
7 - 8 p.m.	8	4.9	4.5
8 - 9 p.m.	11	6.7	8.0
9 - 10 p.m.	8	4.9	7.0
10 - 11 p.m.	13	7.9	8.1
11 - 12 midnight	9	5.5	8.4
Totals	164	100.0	100.0

BETWEEN 7 P.M. AND 4 A.M., THERE WAS A HIGHER PROPORTION OF NON-LICENCED DRIVERS INVOLVED IN COLLISIONS.
ALCOHOL INVOLVEMENT IN COLLISIONS FOLLOWED A SIMILAR PATTERN.

Exhibit 3-13

IMPROPER DRIVER ACTIONS VS ENFORCEMENT

Apparent Improper Driver Action	<u>Column A</u>	<u>Column B</u>	<u>Column B</u> <u>Column A</u>
	% of Improper Driver Actions In Collisions	% of All Comparable Charges Laid in 1984 by Hamilton-Wentworth Police	
Follow too close	17.2	1.8	0.1
Speed too fast	3.9	55.6	14.3
Improper turn	12.7	17.8	1.4
Disobey traffic signal	5.5	8.2	1.5
Disobey stop or yield sign	3.7	5.7	1.5
Fail to yield right-of-way	23.7	1.8	0.1
Improper passing	1.8	0.3	0.2
Lost Control	14.2	-	-
Wrong way on one-way street	0.3	1.8	6.0
Disobey other control	0.8	0.1	0.1
Other	16.1	6.9	0.4
	<u>100.0</u>	<u>100.0</u>	

41% OF IMPROPER DRIVER ACTIONS ASSOCIATED WITH COLLISIONS ARE DRIVER ACTIONS WHICH CANNOT BE READILY ENFORCED, SUCH AS FOLLOWING TOO CLOSELY, OR FAILING TO YIELD THE RIGHT OF WAY.

A PREDOMINANT NUMBER OF CHARGES WERE LAID UNDER LAWS WHICH ARE READILY ENFORCED.

Exhibit 3-14

MOTORCYCLE DRIVER AGE VS DRIVER ACTION

Driver Action	0 - 14	15 - 19	20 - 24	25 - 34	35 - 44	45 +	Total	(%)
Driving Properly Following	-	32	50	44	12	6	144	(56.0)
Too Close Speed Too Fast	-	7	6	3	1	-	17	(6.6)
Improper Turn	-	6	5	4	-	-	15	(5.8)
Disobey Traffic Signal	-	1	-	1	-	-	2	(0.8)
Disobey Stop Sign	-	1	-	-	1	-	2	(0.8)
Fail to Yield R.O.W.	-	3	4	-	-	-	7	(2.7)
Improper Passing	-	2	2	2	-	-	6	(2.3)
Lost Control	-	2	2	-	-	-	4	(1.6)
Wrong Way One-Way Street	-	10	11	6	3	1	31	(12.1)
Not Known	-	-	-	-	-	-	-	(0.0)
Known	1	2	5	3	1	2	14	(5.4)
Other Disobey	-	3	5	5	-	-	13	(5.1)
Other Control	-	1	1	-	-	-	2	(0.8)
Totals	1	70	91	68	18	9	257	(100.0)
% Involved Motorcycle Drivers Driving Properly ^(a)	-	49.2	61.7	73.3	70.6	85.7	62.6	
% Involved Drivers Driving Properly for all Vehicle Types ^(a)	-	39.9	52.8	60.7	60.9	54.1	55.5	

MOTORCYCLE DRIVERS WERE MORE LIKELY TO BE DRIVING PROPERLY THAN MOTOR VEHICLE OPERATORS.

THE MOST FREQUENT IMPROPER MOTORCYCLE DRIVER ACTION WAS "LOST CONTROL".

(a) Excluding "not known" and "other".

Exhibit 3-15

CYCLIST ACTION VS AGE OF CYCLIST

Apparent Cyclist Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24
Driving Properly	-	4	9	28	11
Following Too Close	-	-	-	1	1
Speed Too Fast	-	3	2	3	-
Improper Turn	-	-	4	1	1
Disobey Traffic Signal	-	2	2	-	3
Disobey Stop Sign	-	3	1	1	-
Fail to Yield Right-of-Way	2	9	10	3	5
Improper Passing	-	-	-	2	-
Lost Control	-	2	1	3	-
Wrong Way on One-Way Road	-	1	-	-	1
Not Known	-	-	2	6	-
Other	-	4	4	8	-
Disobey Other Control	-	-	1	-	-
Totals	2	28	36	56	22
% Involved Cyclists Driving Properly (a)	-	16.7	30.0	66.7	50.0

(a) Excluding "Not Known" and "Other".

<u>25 - 34</u>	<u>35 - 44</u>	<u>45 - 54</u>	<u>55 +</u>	<u>Totals</u>	<u>(%)</u>	<u>Apparent Cyclist Action</u>
17	2	3	1	75	(42.1)	Driving Properly
-	-	-	-	2	(1.1)	Following Too Close
-	-	-	-	8	(4.5)	Speed Too Fast
-	-	1	-	7	(3.9)	Improper Turn
-	-	-	-	7	(3.9)	Disobey Traffic Signal
2	-	-	-	7	(3.9)	Disobey Stop Sign
1	-	1	-	31	(17.4)	Fail to Yield Right-of-Way
-	-	-	-	2	(1.1)	Improper Passing
-	-	-	-	6	(3.4)	Lost Control
-	-	-	-	2	(1.1)	Wrong Way on One-Way Road
1	-	1	2	12	(6.8)	Not Known
1	1	-	-	18	(10.1)	Other
-	-	-	-	1	(0.6)	Disobey Other Control
22	3	6	3	178	(100.0)	Totals
						% Involved Cyclists Driving Properly
85.0	100.0	60.0	100.0	50.7		

**CYCLISTS UNDER 15 WERE MOST LIKELY TO BE DRIVING
IN A MANNER THAT VIOLATED BASIC RULES OF THE ROAD.**

Chapter Four

Pedestrians

Chapter Four Pedestrians

General

In 1984, there were 320 pedestrian collisions resulting in 314 pedestrian injuries, and 6 fatalities. For 2 collisions, full information was not available, so this chapter bases statistics on 318 collisions.

Age

The relationship between the Regional population distribution and pedestrian involvement in collisions in 1984 was reviewed (Exhibit 4-1). It was determined that 5 to 9 year old pedestrians had a rate of collision involvement approximately 2.2 times that expected when compared on the basis of the age distribution of the Regional population.

The variations in rate might be explained by certain pedestrian age groups crossing streets more frequently than others (i.e. exposure). It is, however, unlikely that the 5 to 9 year old group would have different exposure to traffic than the 10 to 14 year old group, and, therefore, the 5 to 9 year old pedestrian would appear to be considerably more prone to collision involvement.

Pedestrian Action

Exhibit 4-2 indicates the pedestrian action at the time of the collision versus pedestrian age. In general, the instances of unsafe pedestrian action for pedestrians involved in collisions were greater for pedestrians under 10 years of age.

This exhibit also indicates that the actions of "coming from behind a parked car" or "unexpectedly running into the roadway" accounted for 31.7 percent of the pedestrian actions at the time of the collisions. These unsafe actions are particularly associated with pedestrians under 10 years of age.

Pedestrians under 14 years of age and between 65 and 74 years of age were more likely to be involved in collisions as a result of not crossing with the right of way at traffic signals (Exhibit 4-3).

Time of Collision

An analysis was performed on the time of day of collisions compared to pedestrian age (Exhibit 4-4) and it was determined that 27.4 percent of pedestrians were injured in collisions which occurred between 3 p.m. and 6 p.m. Forty-three children between 5 and 14 years of age were involved in pedestrian collisions which occurred at school crossing times.* This represents 14 percent of the 318 pedestrians involved in collisions in 1984 or 46 percent of all involved 5 - 14 year olds. Of the 43 school age children involved, 11 were crossing at traffic signals.

* School crossing times: 8:00 a.m. - 9:15 a.m., 11:30 a.m. - 1:45 p.m., 3:30 p.m. - 4:45 p.m., Monday - Friday; excluding June, July and August.

Pedestrian Condition

In most cases, the condition of the pedestrian involved in the collision was reported as normal. However, in approximately 8 percent of the collisions involving pedestrians, the pedestrian condition was recorded as "had been drinking" or "impaired" (Exhibit 4-5).

Locations

Exhibit 4-6 indicates the pedestrian age for pedestrians involved in collisions compared with the type of traffic control. In 45.9 percent of the pedestrian collisions, the collision occurred at a mid-block or other location with no control. For pedestrians under 10 years of age, 49 percent were involved at mid-block or other locations with no control. This is to be expected, as the majority of collisions that involved a young pedestrian resulted from the pedestrian entering the roadway unexpectedly.

Driver Action

Exhibit 4-7 indicates that in approximately 63 percent of the motor vehicle-pedestrian collisions, the driver was recorded as driving properly. This figure does not necessarily suggest that the drivers involved in these collisions were totally without blame but does indicate that a majority of pedestrian collisions are associated with improper pedestrian action or lack of awareness of traffic conditions at the time of the collision.

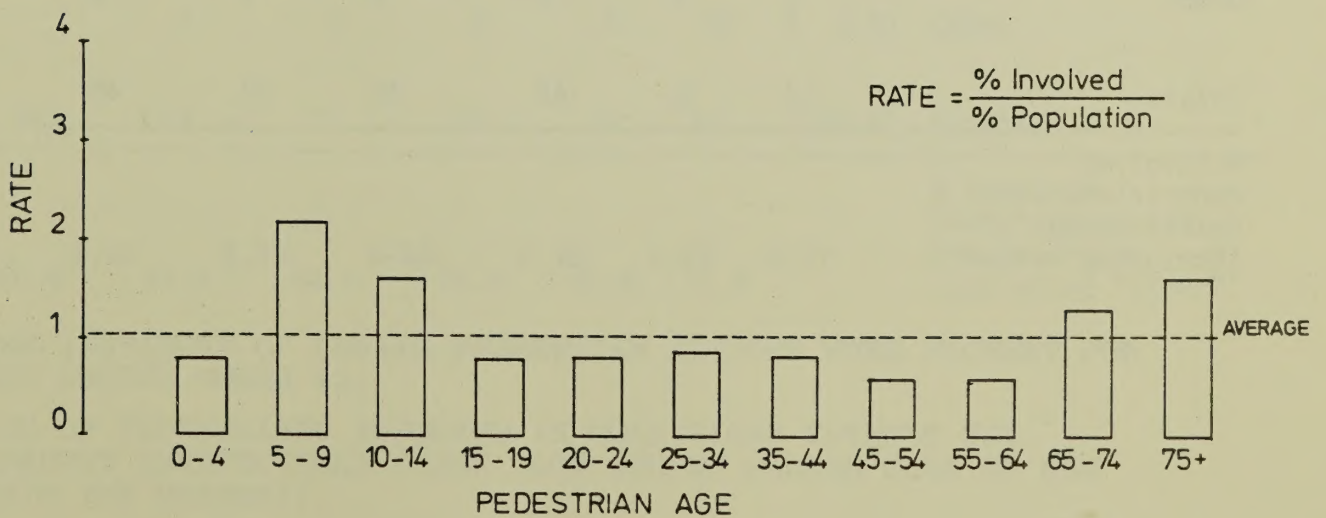
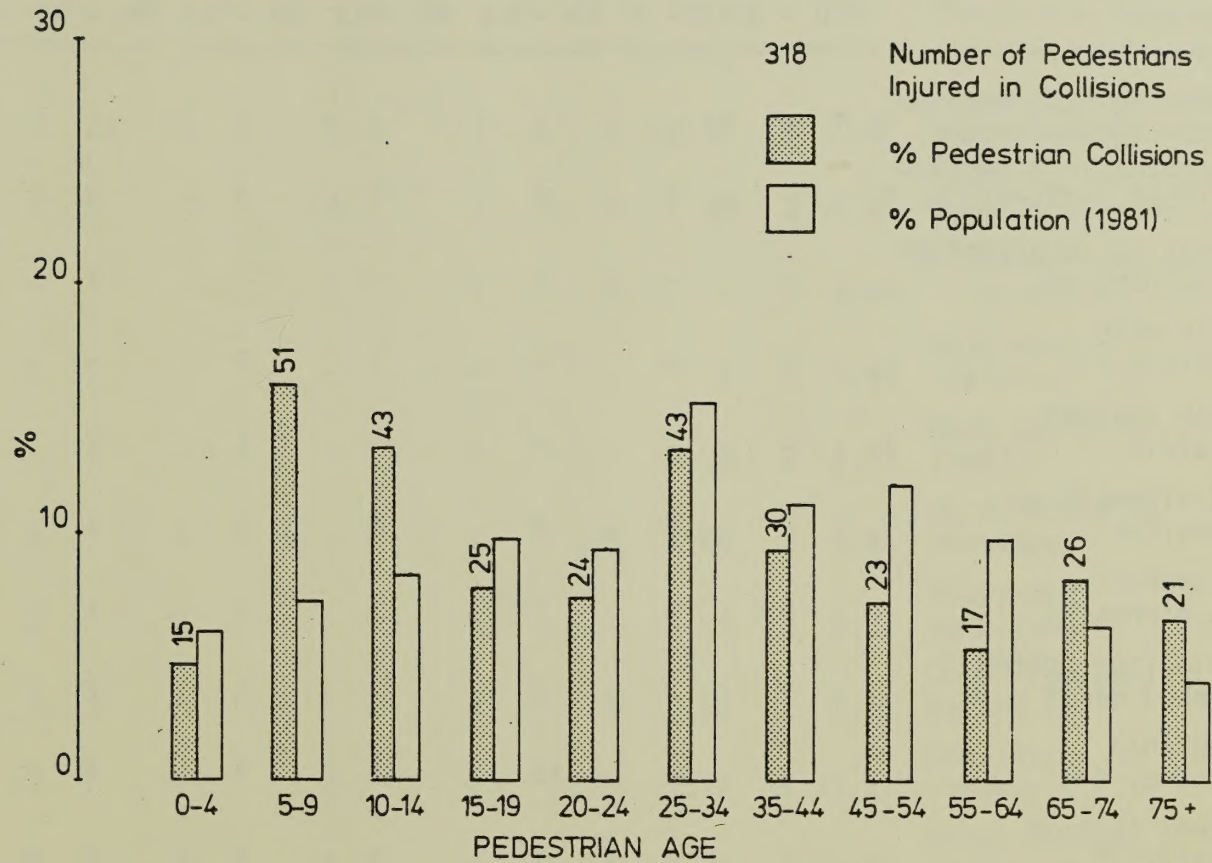
Of the 37 percent of motor vehicle-pedestrian collisions in which the driver was not driving properly, the most frequently recorded driver action was failing to yield the right-of-way (associated with 13 percent of all motor vehicle-pedestrian collisions).

Pedestrian Injuries

Most pedestrians (approximately 84%) suffered only minor injuries when involved in a collision. Exhibit 4-8 indicates that pedestrians under 5 or over 54 years of age were more likely to suffer serious injury. This figure may be as a result of crossing behaviour or may simply reflect the average persons' ability to recover from injury or partially avoid the collision.

Exhibit 4-1

PEDESTRIAN AGE VS POPULATION



5 TO 9 YEAR OLD PEDESTRIANS WERE INVOLVED IN COLLISIONS AT A RATE TWO TIMES THE AVERAGE.

Exhibit 4-2

PEDESTRIAN AGE VS ACTION

Pedestrian Action	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34
Crossing intersection with right-of-way	2	6	4	3	6	13
Crossing intersection without right-of-way *	-	1	8	3	6	3
Crossing intersection - no control	-	-	-	-	-	1
Walk with traffic *	-	-	-	-	1	-
Walk against traffic	-	-	-	-	1	1
On sidewalk or shoulder	-	2	2	3	2	4
Play/work on highway *	-	2	1	1	1	1
Come from behind parked car *	7	7	4	-	1	2
Run into roadway *	4	30	15	5	3	9
Cross through traffic *	-	2	7	5	3	5
Other	1	1	2	5	-	4
Totals	14	51	43	25	24	43
% Involved Pedestrians with Unsafe Action (Excluding "other")	73.3	82.4	81.4	56.0	62.5	46.5

* Actions considered unsafe

<u>35 - 44</u>	<u>45 - 54</u>	<u>55 - 64</u>	<u>65 - 74</u>	<u>75 +</u>	<u>Total</u>	<u>(%)</u>	<u>Pedestrian Action</u>
9	8	4	8	3	66	(20.8)	Crossing intersection with right-of-way
2	2	4	7	4	40	(12.6)	Crossing intersection without right-of-way *
-	-	-	1	3	5	(1.6)	Crossing intersection - no control
1	-	-	-	-	2	(0.6)	Walk with traffic *
-	-	-	1	-	3	(1.0)	Walk against traffic
6	2	-	1	2	24	(7.6)	On sidewalk or shoulder
1	2	-	-	-	9	(2.8)	Play/work on highway *
1	-	1	-	1	24	(7.6)	Come from behind parked car *
4	2	3	2	-	77	(24.3)	Run into roadway *
6	5	3	4	5	45	(14.2)	Cross through traffic *
-	2	2	2	3	22	(6.9)	Other
30	23	17	26	21	317	(100.0)	Totals
50.0	47.8	64.7	50.0	47.6	61.9		% Involved Pedestrians with Unsafe Action (Excluding "other")

THE INSTANCES OF UNSAFE PEDESTRIAN ACTIONS WERE HIGHEST FOR AGE GROUPS UNDER 15.

32% OF PEDESTRIANS INVOLVED IN COLLISIONS ENTERED THE ROADWAY UNEXPECTEDLY (CAME FROM BEHIND PARKED CARS OR RAN INTO THE ROADWAY).

Exhibit 4-3

PEDESTRIAN AGE VS ACTION AT TRAFFIC SIGNALS

Pedestrian Action	0 - 4 Years	5 - 9 Years	10 - 14 Years	15 - 19 Years	20 - 24 Years	25 - 34 Years
Crossing Intersection with Right- of-Way	1	5	3	2	3	6
Crossing Intersection without Right- of-Way *	-	1	6	3	4	3
Walking on Roadway Against Traffic	-	-	-	-	1	-
On Sidewalk or Shoulder	-	-	-	-	-	-
Coming From Behind Parked Vehicle or Object* 1	-	-	-	-	-	-
Run Into Roadway *	-	3	5	2	-	4
Cross Through Traffic *	-	-	-	1	-	1
Other	-	-	-	-	-	1
Total	2	9	14	8	8	15
% Pedestrians Crossing or Walking with Right-of- Way (a)	50.0	55.6	21.4	25.0	37.5	46.2

NOTES: (a) Not including "Other"
 * Actions considered unsafe

35 - 44 Years	45 - 54 Years	55 - 64 Years	65 - 74 Years	75 + Years	Row Total	%	Pedestrian Action
6	8	2	5	1	42	(39.3)	Crossing Intersection with Right- of-Way
2	2	4	6	1	32	(29.9)	Crossing Intersection without Right -of-Way
-	-	-	-	-	1	(0.9)	Walking on Roadway Against Traffic
-	2	-	1	-	3	(2.8)	On Sidewalk or Shoulder
-	-	1	-	-	2	(1.9)	Coming From Behind Parked Vehicle or Object*
1	-	1	-	-	16	(15.0)	Run Into Roadway *
1	1	-	1	1	6	(5.6)	Cross Through Traffic *
-	-	1	1	2	5	(4.7)	Other
10	13	9	14	5	107	(100.0)	Total
66.7	61.5	25.0	38.5	33.3	41.2		% Pedestrians Crossing or Walking with Right-of-Way (a)

PEDESTRIANS UNDER THE AGE OF 20 AND OVER 65 YEARS OF AGE WERE MUCH MORE LIKELY TO BE INVOLVED IN A COLLISION WHILE CROSSING WITHOUT THE RIGHT-OF-WAY.

Exhibit 4-4

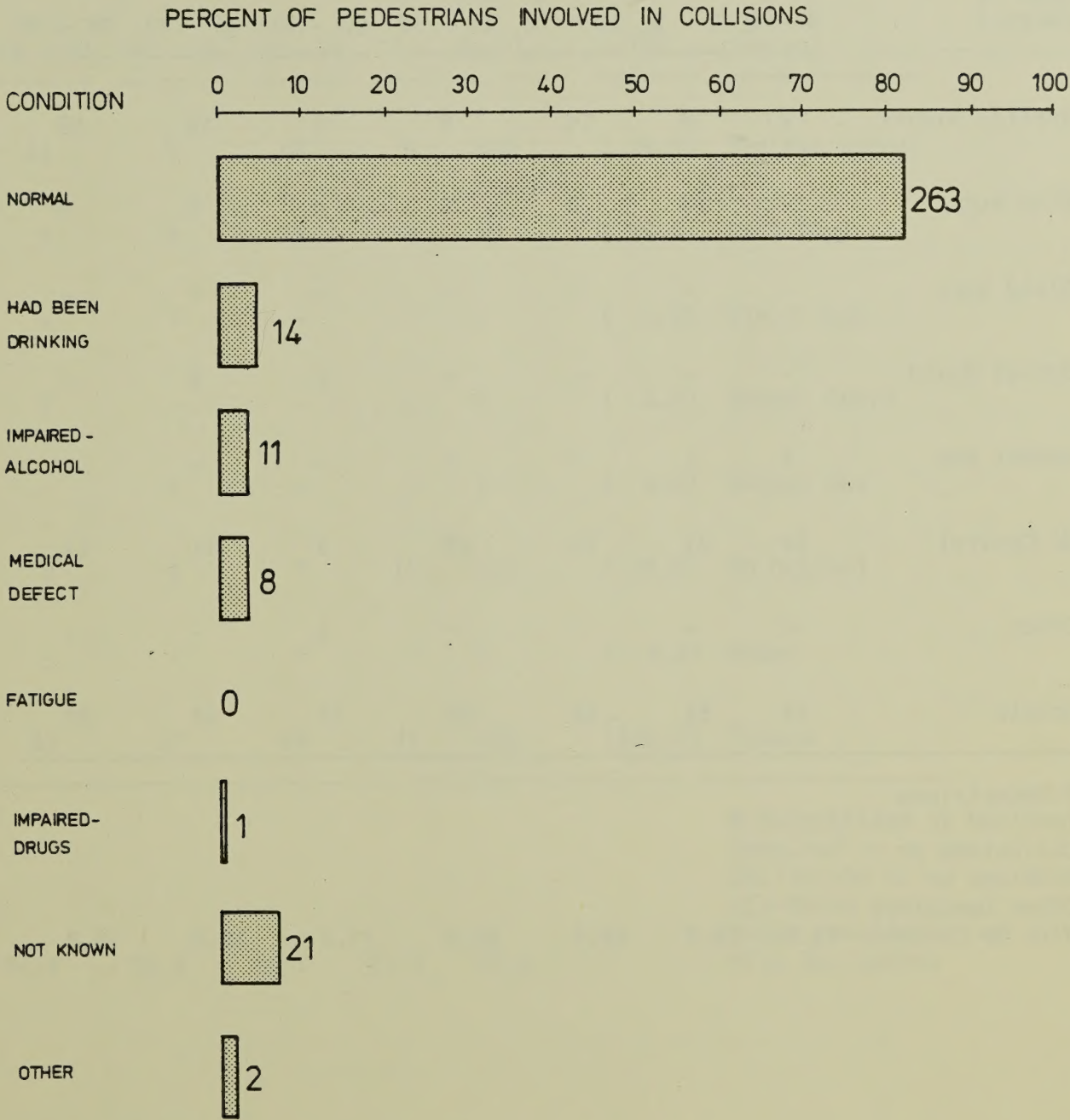
TIME OF DAY VS PEDESTRIAN AGE

Time of Day	0-4 Yrs	5-9 Yrs	10-14 Yrs	15-19 Yrs	20-24 Yrs	25-34 Yrs	35-44 Yrs	45-54 Yrs	55-64 Yrs	65-74 Yrs	75 + Yrs	Row Total
12 - 1 a.m.	-	-	-	-	1	2	-	-	1	-	-	4
1 - 2 a.m.	-	-	-	1	2	1	-	-	-	-	-	4
2 - 3 a.m.	-	-	-	-	-	2	-	-	-	-	-	2
3 - 4 a.m.	-	-	-	-	-	-	-	-	-	-	-	-
4 - 5 a.m.	-	-	-	-	-	-	-	-	-	-	-	-
5 - 6 a.m.	-	-	-	-	-	-	-	-	-	-	-	-
6 - 7 a.m.	-	-	1	1	-	2	2	1	1	-	-	8
7 - 8 a.m.	-	1	2	1	1	2	1	1	-	1	1	10
8 - 9 a.m.	-	6	6	-	-	3	1	3	-	-	1	20
9 - 10 a.m.	1	-	1	-	-	-	3	-	1	2	-	8
10 - 11 a.m.	1	-	2	1	1	1	1	-	1	2	2	12
11 - 12 noon	2	2	-	-	-	3	-	1	1	4	6	19
12 - 1 p.m.	3	10	3	-	2	3	2	3	-	3	-	29
1 - 2 p.m.	-	4	4	3	2	3	1	1	-	-	2	20
2 - 3 p.m.	-	2	1	1	1	2	1	4	-	-	1	13
3 - 4 p.m.	2	10	6	3	1	2	4	-	1	3	1	33
4 - 5 p.m.	1	7	6	3	2	-	2	2	3	1	2	29
5 - 6 p.m.	1	5	5	3	1	3	2	1	3	1	-	25
6 - 7 p.m.	2	1	2	1	1	3	2	3	1	3	2	21
7 - 8 p.m.	2	3	1	2	-	2	-	2	-	1	2	15
8 - 9 p.m.	-	1	2	2	4	4	1	-	1	2	1	18
9 - 10 p.m.	-	-	-	2	-	3	2	-	1	2	-	10
10 - 11 p.m.	-	-	1	1	4	1	1	-	1	-	-	9
11 - 12 a.m.	-	-	-	-	1	1	4	1	1	1	-	9
Total	15	51	43	25	24	43	30	23	17	26	21	318

27.4% OF PEDESTRIANS WERE INJURED IN COLLISIONS
WHICH OCCURRED BETWEEN 3 P.M. AND 6 P.M.

Exhibit 4-5

PEDESTRIAN CONDITION



7.8 PERCENT OF THE PEDESTRIANS INVOLVED IN COLLISIONS WERE IMPAIRED BY OR HAD BEEN DRINKING ALCOHOL.

Exhibit 4-6

PEDESTRIAN AGE VS TYPE OF TRAFFIC CONTROL

Type of Control	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34	35 - 44
Traffic Signal	2	9	14	8	8	15	10
Stop Sign	-	10	9	5	6	5	8
Yield Sign	-	-	-	-	-	-	-
School Guard	-	-	-	-	1	2	-
School Bus	1	1	-	-	-	-	-
No Control	12	31	20	12	8	21	12
Other	-	-	-	-	1	-	-
Totals	15	51	43	25	24	43	30

% Pedestrians Involved in Collisions at Midblock or Other Locations With No Control	80.0	60.8	46.5	48.0	37.5	48.8	40.0
--	------	------	------	------	------	------	------

<u>45 - 54</u>	<u>55 - 64</u>	<u>65 - 74</u>	<u>75 +</u>	<u>Totals</u>	<u>(%)</u>	<u>Type of Control</u>
13	9	14	5	107	(33.7)	Traffic Signal
1	4	5	6	59	(18.6)	Stop Sign
-	-	-	-	-	(0.0)	Yield Sign
1	-	-	-	4	(1.3)	School Guard
-	-	-	-	2	(0.6)	School Bus
8	4	7	10	145	(45.6)	No Control
-	-	-	-	1	(0.3)	Other
23	17	26	21	318	(100.0)	Totals
						% Pedestrians Involved in Collisions at Mid-Block or Other Locations With No Control
34.8	23.5	26.9	47.6	45.9		

46% OF PEDESTRIAN COLLISIONS OCCURRED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

FOR PEDESTRIANS UNDER 10 YEARS OF AGE 49% WERE INVOLVED AT MID-BLOCK OR OTHER LOCATIONS WITH NO CONTROL.

Exhibit 4-7

DRIVER ACTION IN PEDESTRIAN COLLISIONS

<u>Action</u>	<u>In Pedestrian Collisions</u>	<u>% Pedestrian Collisions</u>
Driving Properly	198	62.5
Following Too Closely	1	0.3
Speed Too Fast	4	1.3
Improper Turn	3	1.0
Disobey Traffic Signal	5	1.6
Disobey Stop Sign	2	0.6
Fail to Yield Right-of-Way	42	13.3
Improper Passing	-	-
Wrong Way One-Way Street	-	-
Lost Control	4	1.3
Not Known	33	10.4
Other	18	5.7
Disobey Other Control	7	2.2
	317 (a)	100.0

63% OF THE MOTOR VEHICLE DRIVERS INVOLVED IN PEDESTRIAN COLLISIONS WERE RECORDED AS DRIVING PROPERLY.

THE MOST FREQUENTLY RECORDED IMPROPER DRIVER ACTION WAS FAILURE TO YIELD THE RIGHT-OF-WAY.

- (a) Note - Pedestrian collisions involved more than one driver or vehicle in some cases. Data not available on driver action in several collisions.

Exhibit 4-8

PEDESTRIAN AGE VERSUS INJURY STATUS

Pedestrian Age	Minimal	Status of Injury			Total	% Major or Fatal Injury
		Minor	Major	Fatal		
0 - 4	6	6	2	1	15	20.0
5 - 9	25	19	7	-	51	13.7
10 - 14	13	26	4	-	43	9.3
15 - 19	10	13	2	-	25	8.0
20 - 24	7	13	4	-	24	16.7
25 - 34	17	17	8	1	43	18.6
35 - 44	13	14	3	-	30	10.0
45 - 54	6	14	3	-	23	13.0
55 - 64	2	11	4	-	17	23.5
65 - 74	8	10	6	2	26	30.8
75 & Over	4	12	3	2	21	23.8
TOTAL	111	155	46	6	318	16.4
%	34.9	48.7	14.5	1.9	100.0	

EIGHTY-FOUR PERCENT OF PEDESTRIANS INVOLVED IN COLLISIONS SUFFERED ONLY MINIMAL OR MINOR INJURIES.

PEDESTRIANS UNDER 5 YEARS OF AGE OR OVER 54 YEARS OF AGE WERE MOST LIKELY TO SUFFER SERIOUS INJURY IN A COLLISION.

Chapter Five

Vehicles

Vehicle Type

For drivers involved in collisions, the percentage of drivers driving properly was higher than average for drivers of conventional buses (Exhibit 5-1). Caution should be exercised when interpreting this exhibit as there is no indication of vehicle exposure.

Vehicle Defects

Vehicle defects were recorded for 150 or approximately 1 percent of the vehicles involved in 1984 collisions (Exhibit 5-2). The most frequently recorded defect was a poor or ineffective vehicle braking system. Although a vehicle defect was recorded, it does not necessarily follow that the defect was the proximate cause of the collision.

Exhibit 5-1

DRIVER ACTION VS VEHICLE TYPE

Driver Action	Non-motor Vehicle	Passenger Car	Car and Trailer	Truck	Truck and Semi	Truck and Trailer
Driving Properly	75	4,947	10	674	59	19
Follow Too Close	2	800	2	146	12	2
Speed Too Fast	8	186	-	25	1	-
Improper Turn	7	598	-	91	28	1
Disobey Traffic Signal	7	274	-	36	2	-
Disobey Stop Sign	7	176	-	28	1	-
Fail to Yield R.O.W.	31	1,164	1	165	8	1
Improper Passing	2	78	-	20	1	-
Lost Control	6	708	-	99	4	-
Wrong Way on One-Way	2	20	-	-	-	-
Not Known	13	817	-	123	15	1
Other	18	660	3	227	21	3
Disobey Other Control	1	28	-	11	3	-
Totals	179	10,456	16	1,645	155	27

% Involved Drivers Driving Properly (a)	50.7	55.1	76.9	52.1	49.6	79.2
---	------	------	------	------	------	------

FOR DRIVERS INVOLVED IN COLLISIONS, THE PERCENTAGE OF DRIVERS DRIVING PROPERLY WAS HIGHEST FOR DRIVERS OF CONVENTIONAL-TYPE BUSES.

(a) Excluding "not known" and "other".

Motor-Cycle	Bus	School Bus	Other	Totals	(%)	Driver Action
144	118	11	-	6,057	(46.9)	Driving Properly
17	7	1	-	989	(7.7)	Follow Too Close
15	1	-	-	236	(1.8)	Speed Too Fast
2	3	2	-	732	(5.7)	Improper Turn
2	2	-	-	323	(2.5)	Disobey Traffic Signal
7	1	-	-	220	(1.7)	Disobey Stop Sign
6	4	2	1	1,383	(10.7)	Fail to Yield R.O.W.
4	2	1	-	108	(0.8)	Improper Passing
31	1	1	-	850	(6.7)	Lost Control
-	-	-	-	22	(0.2)	Wrong Way on One-Way
16	6	1	1	993	(7.7)	Not Known
13	9	1	1	956	(7.4)	Other
2	2	-	-	47	(0.4)	Disobey Other Control
259	156	20	3	12,916	(100.0)	Totals

62.6	83.7	61.1	0.0	55.2	% Involved Drivers Driving Properly ^(a)
------	------	------	-----	------	---

VEHICLE DEFECTS

Defect Type	Non Motor Vehicle	Passenger Cars	Car and Trailer	Truck	Truck and Trailer	Truck and Semi	Motor-Cycle	Bus	School Bus	Other	Totals	%
Brakes	3	24	-	8	-	3	1	1	-	-	40	26.7
Steering	-	5	-	1	1	-	-	-	-	-	7	4.7
Tire Puncture or Blowout	-	9	-	2	-	-	-	-	-	-	11	7.3
Tire Tread Insufficient	-	9	-	-	-	1	2	-	-	-	12	8.0
Headlamps Defective	2	2	-	1	-	-	-	-	-	-	5	3.3
Other Lamps or Reflectors Defective	-	5	-	-	-	1	-	-	-	-	6	4.0
Engine Control Defective	-	6	-	1	-	-	-	-	-	-	7	4.7
Wheels or Suspension Defective	-	3	-	3	-	-	-	-	1	-	7	4.7
Vision Obsured	-	6	-	2	-	-	1	-	-	-	9	6.0
Trailer Hitch Defective	-	-	-	1	4	2	-	-	-	-	7	4.7
Other	2	22	-	12	2	1	-	-	-	-	39	26.0
Totals	7	91	-	31	7	8	4	1	1	-	150	100.0

3.9 0.8 0.0 1.8 25.9 5.1 1.5 0.6 5.0 0.0 1.1%

Defective Vehicles as a % of all vehicles of the same type involved in collisions (a)

DEFECTIVE BRAKES ACCOUNTED FOR 26.7% OF THE RECORDED DEFECTS.

(a) Does not include parked vehicles.

Chapter Six

Environment

Light Conditions

Exhibit 6-1 indicates that most collisions occurred under clear visibility conditions. Although poor light conditions can make driving difficult, collisions under these conditions are probably associated with drivers failing to adjust properly to changed conditions, particularly those associated with the roadway surface. Exhibit 6-2 indicates that 65.8 percent of the collisions occurred under daylight conditions.

Road Surface

An estimated 63.8 percent of collisions occurred under dry pavement conditions (Exhibit 6-3).

Pavement Markings

In accordance with Exhibit 6-4, an estimated 76.8 percent of collisions occurred on marked roadways where the markings were visible. In over 74 percent of the cases where the road markings were recorded as not visible or obscured, snow, slush, or ice conditions were also reported. It is important to note that pavement markings that are not visible to the driver are not necessarily associated with collision cause. Further analysis would be necessary to indicate whether or not there was a causal relationship.

Road Character

Exhibits 6-5 and 6-7 show that of collisions occurring at intersections, 62 percent occurred at the intersection of two, two-way undivided roads and 87 percent occurred at the intersection of two roadways with straight and level alignment.

Exhibits 6-6 and 6-8 show that, for collisions occurring at locations other than intersections, 80 percent occurred on two-way undivided roadways and 73 percent occurred on straight and level alignment.

As normalizing data such as the percentages, various categories of intersections and the traffic volumes passing through those intersections is not presently available, it is not possible to state that one intersection type is less prone to collision occurrence than another. However, the reader is referred to Exhibit 7-4 in regard to signalized intersections and Exhibit 7-7 in regard to arterial roadway sections.

Road Location and Traffic Control

Exhibit 6-9 indicates that the greatest number of collisions occurred at non-intersection locations. If the intersection-related and in-intersection categories are combined, there were a greater number of collisions directly or indirectly related to intersections. As the exposure to vehicle conflicts is inherently greater at intersection locations, this result is not unexpected. Exhibit 6-10 indicates that collisions occurring at signalized intersections have approximately the same chance of resulting in serious injury than do collisions occurring at stop- or yield-controlled intersections, or locations with no control.

Exhibit 6-11 indicates that the measured point of impact of almost one-half of all collisions was within 9 metres of the curb lines of an intersection. Twenty-one percent of collisions occurred at signalized intersections, and 10% of collisions occurred at intersections with no formal control.

Road Condition

An estimated 99 percent of roads were in good condition at the time of the collision (Exhibit 6-12). Although some roadways were under construction or under repair in the vicinity of the collision, this does not directly imply that road condition was a contributing cause of the collision.

Fixed Objects

There were 1,121 recorded cases where vehicles struck fixed objects by the roadside (Exhibits 6-13 and 6-14). Twenty-eight percent of the fixed objects struck by vehicles were rigid poles. In 79% of all fixed object collisions, a single motor vehicle left the roadway and struck a roadside object as its primary impact. In the remaining cases (21%), it would appear that the fixed object was struck after impact with another vehicle or pedestrian.

The chances of injury or death occurring were higher in collisions involving two or more vehicles in which a fixed object was struck than in single motor vehicle fixed object collisions. This may reflect the different nature of the types of collisions.

Five collisions in which a fixed object was struck resulted in fatalities. This frequency is approximately three times the rate of occurrence of fatalities in collisions in which no fixed object was involved.

Exhibit 6-1

VISIBILITY CONDITIONS

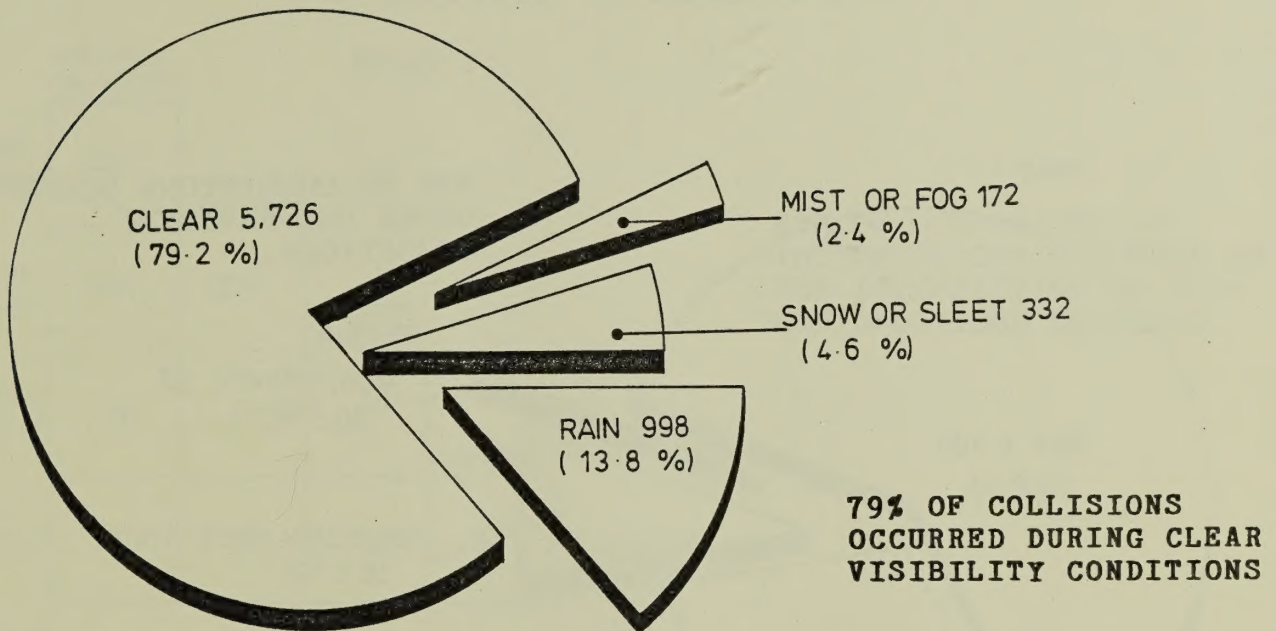


Exhibit 6-2

LIGHT CONDITIONS

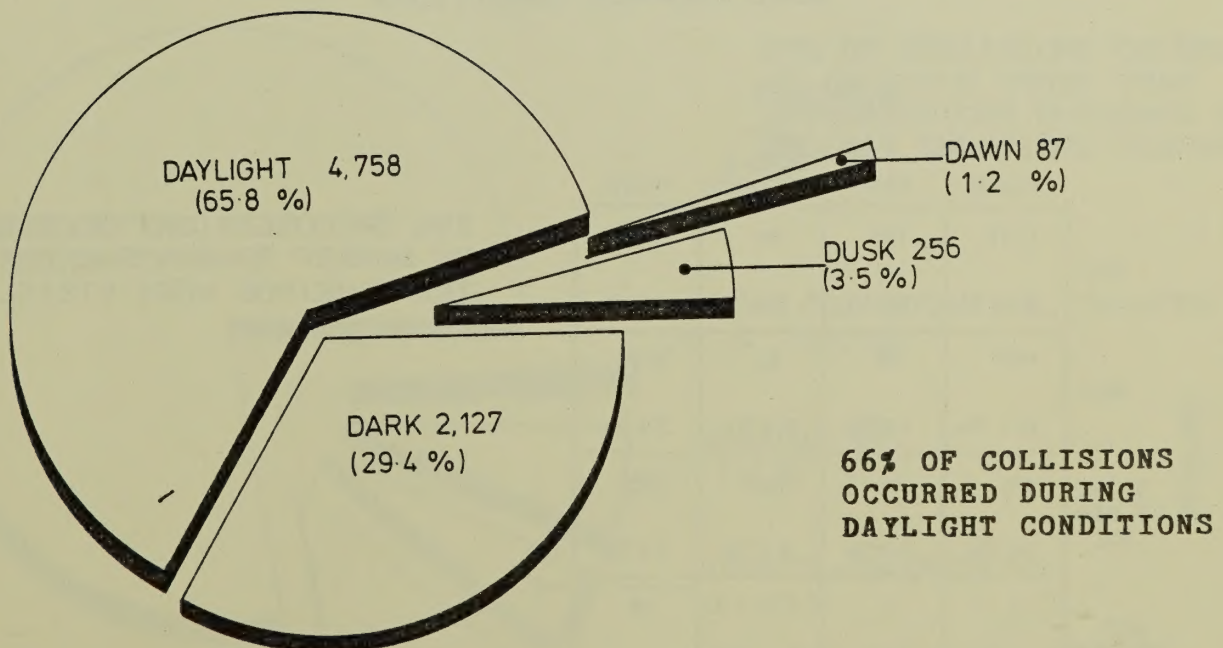


Exhibit 6-3

ROAD 1 SURFACE CONDITIONS

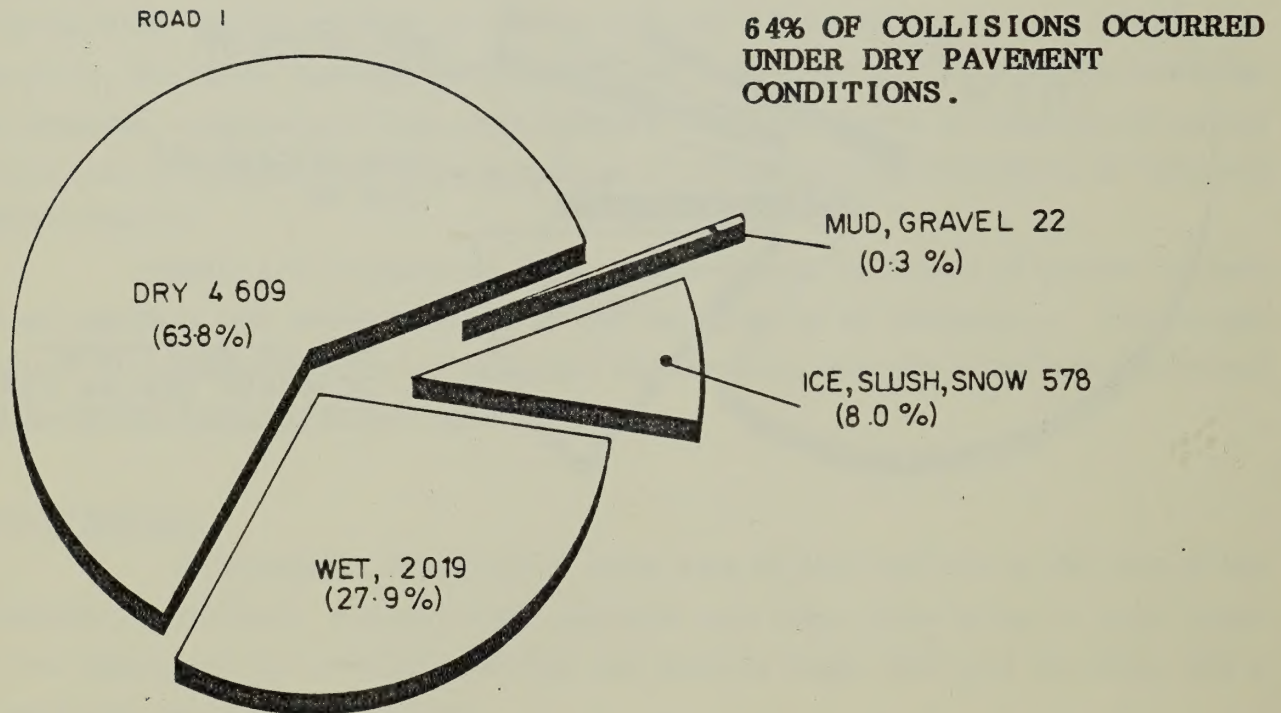


Exhibit 6-4

ROAD 1 PAVEMENT MARKINGS VERSUS ROAD SURFACE CONDITIONS

		MARKINGS			
		GOOD	FAIR	NOT VISIBLE OBSCURED	NONE
SURFACE	DRY	3710 51.3 %	156 2.2 %	34 0.4 %	709 9.8 %
	WET	1667 23.1 %	88 1.2 %	62 0.9 %	202 2.8 %
	SNOW SLUSH ICE	175 2.4 %	13 0.2 %	290 4.0 %	100 1.4 %
	MUD GRAVEL	1 0.0 %	1 0.0 %	2 0.0 %	18 0.3 %

80% OF COLLISIONS OCCURRED ON MARKED ROADWAYS WHERE THE MARKINGS WERE VISIBLE.

Exhibit 6-5

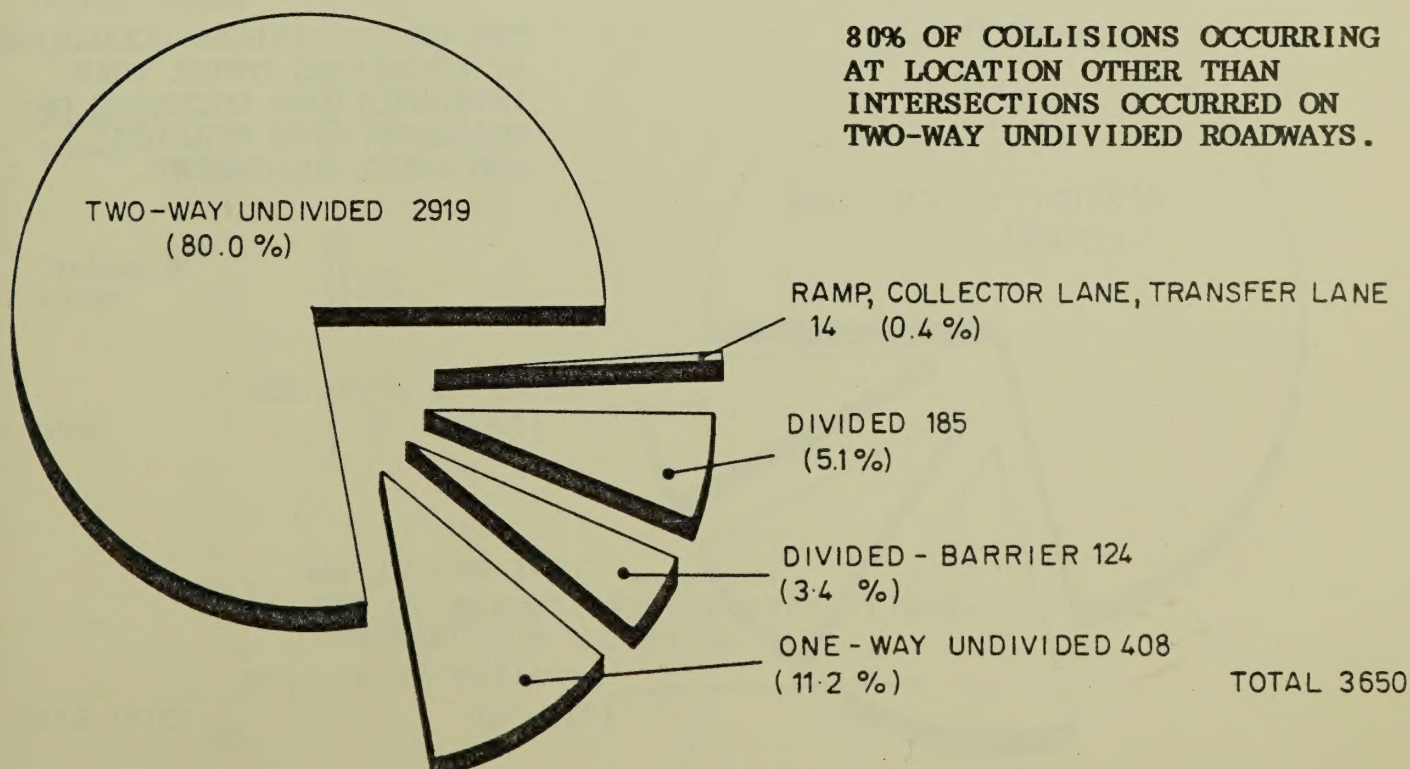
ROAD CHARACTER FOR COLLISIONS OCCURRING AT INTERSECTIONS (a)

		ROAD 1				
ONE-WAY UNDIVIDED	ONE-WAY UNDIVIDED	TWO-WAY UNDIVIDED	DIVIDED BARRIER	DIVIDED	COLLECTOR LANES RAMPS	
	590					
TWO-WAY UNDIVIDED	463	2214				
DIVIDED BARRIER	22	31	51			
DIVIDED	39	75	2	80		
COLLECTOR LANES RAMPS	0	4	2	2	3	
TOTAL		1114	2324	55	82	3
						3578

**62% OF COLLISIONS AT
INTERSECTIONS OCCURRED AT
THE INTERSECTION OF TWO-
WAY UNDIVIDED ROADWAYS.**

Exhibit 6-6

ROAD CHARACTER FOR COLLISIONS NOT OCCURRING AT INTERSECTIONS (b)



- (a) COLLISIONS REPORTED AS BEING IN THE INTERSECTION OR INTERSECTION-RELATED. DATA INCOMPLETE IN 47 CASES.
- (b) COLLISIONS NOT REPORTED AS BEING IN THE INTERSECTION OR INTERSECTION-RELATED.

Exhibit 6-7

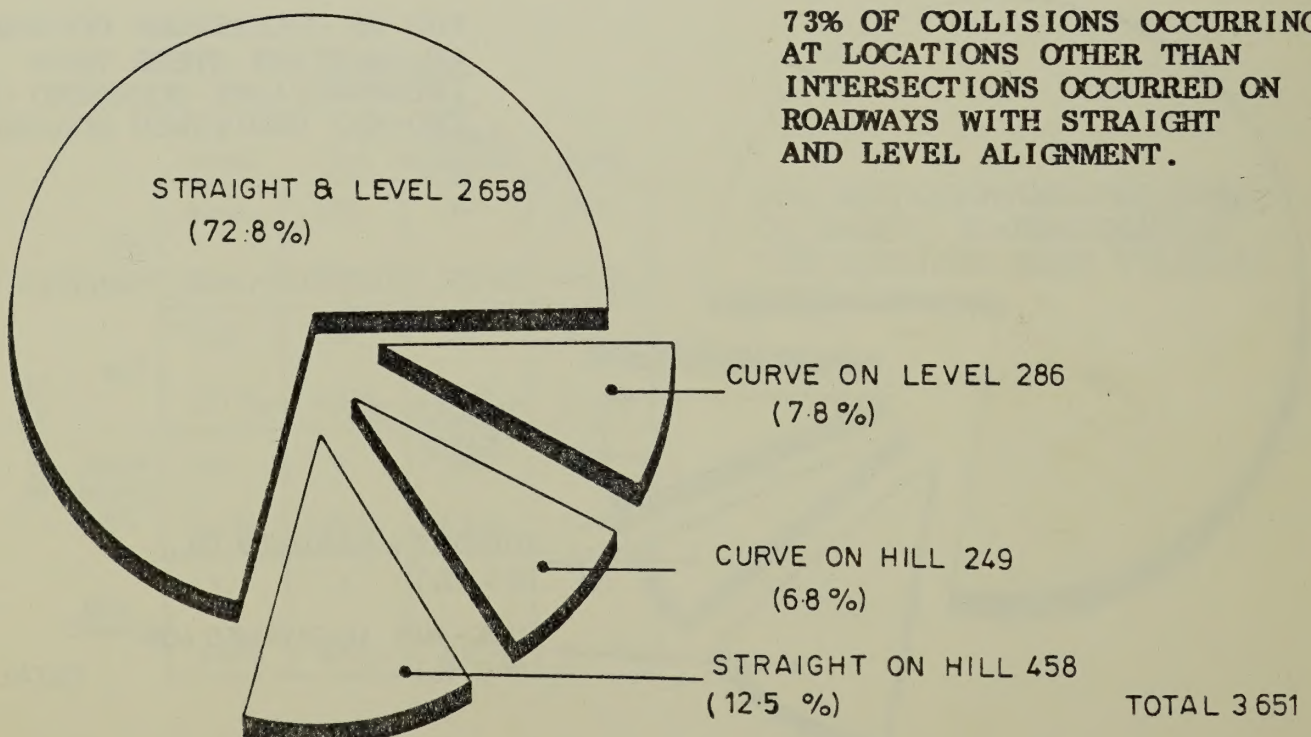
ROAD ALIGNMENT FOR COLLISIONS OCCURRING AT INTERSECTIONS (a)

		ROAD 1			
ROAD 2	STRAIGHT & LEVEL				
	STRAIGHT & LEVEL	3104			
	STRAIGHT ON HILL	178	106		
	CURVE ON LEVEL	69	10	44	
	CURVE ON HILL	24	16	5	21
TOTALS		3 375	132	49	21
		3 577			

**87% OF COLLISIONS OCCURRED
AT THE INTERSECTION OF
TWO STRAIGHT AND LEVEL
ROADWAYS.**

Exhibit 6-8

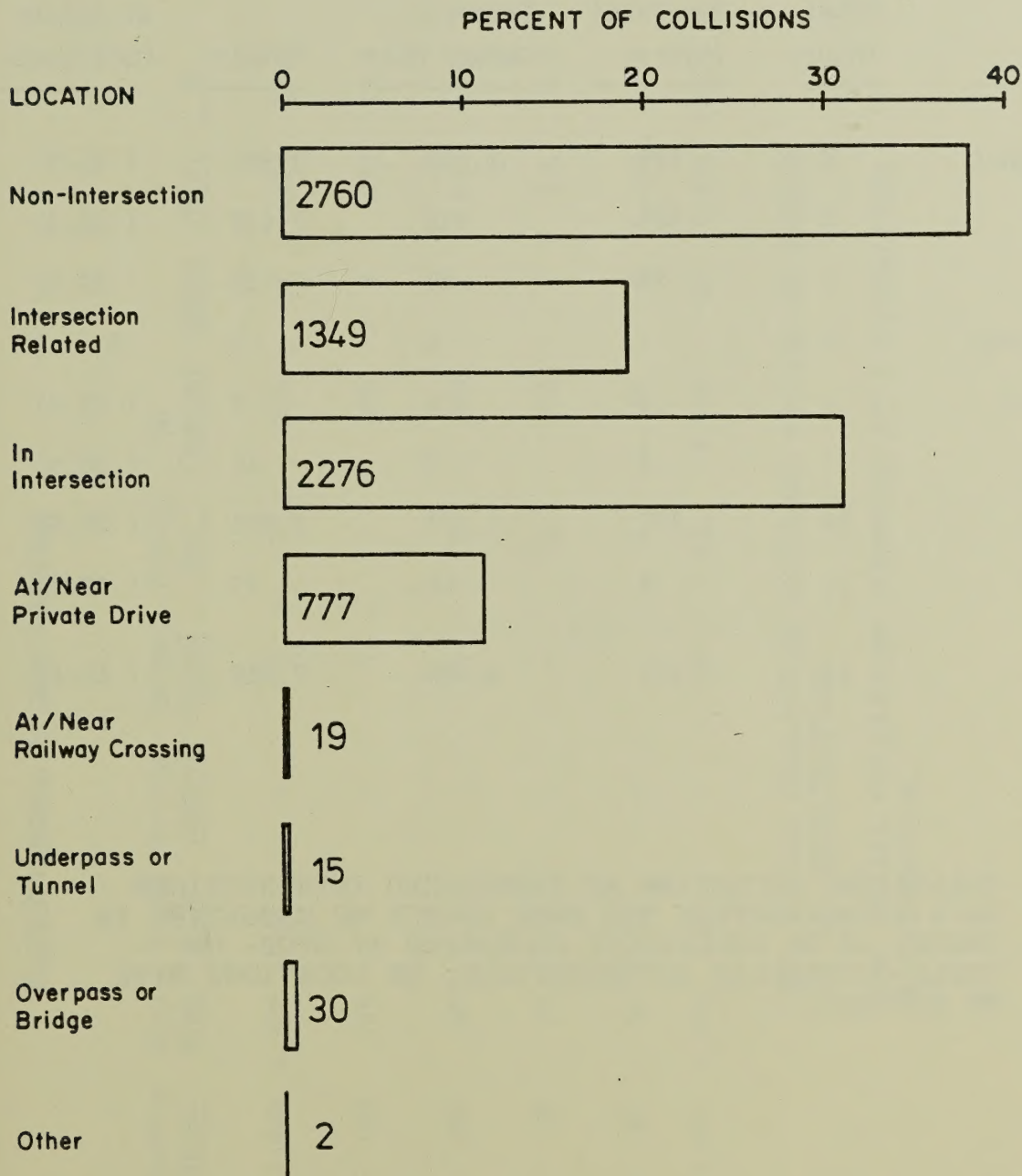
ROAD ALIGNMENT FOR COLLISIONS NOT OCCURRING AT INTERSECTIONS (b)



- (a) COLLISIONS REPORTED AS BEING IN THE INTERSECTION OR INTERSECTION-RELATED. DATA INCOMPLETE IN 48 CASES.
- (b) COLLISIONS NOT REPORTED AS BEING IN THE INTERSECTION OR INTERSECTION-RELATED.

Exhibit 6-9

LOCATION OF COLLISIONS



50% OF COLLISIONS OCCURRED AT NON-INTERSECTION LOCATIONS.

Exhibit 6-10

TRAFFIC CONTROL VS CLASS OF COLLISION

<u>Traffic Control</u>	<u>Fatal Injury</u>	<u>Non-Fatal Injury</u>	<u>Property Damage Only</u>	<u>Totals</u>	<u>(%) Fatal or Injury Collisions</u>
Traffic Signal	3	786	1,103	1,892	(41.7)
Stop Sign	5	593	939	1,537	(38.9)
Yield Sign	-	25	37	62	(40.3)
Police Control	-	-	1	1	(-)
School Guard	-	5	2	7	(71.4)
School Bus	-	4	7	11	(36.4)
No Control	10	1,307	2,379	3,696	(35.6)
Other	-	6	16	22	(27.3)
Totals	18	2,726	4,484	7,228	(38.0)

COLLISIONS OCCURRING AT SIGNALIZED INTERSECTIONS HAVE APPROXIMATELY THE SAME CHANCE OF RESULTING IN INJURY AS DO COLLISIONS OCCURRING AT STOP- OR YIELD-CONTROLLED INTERSECTIONS, OR LOCATIONS WITH NO CONTROL.

Exhibit 6-11

TRAFFIC CONTROL VS ROAD LOCATION

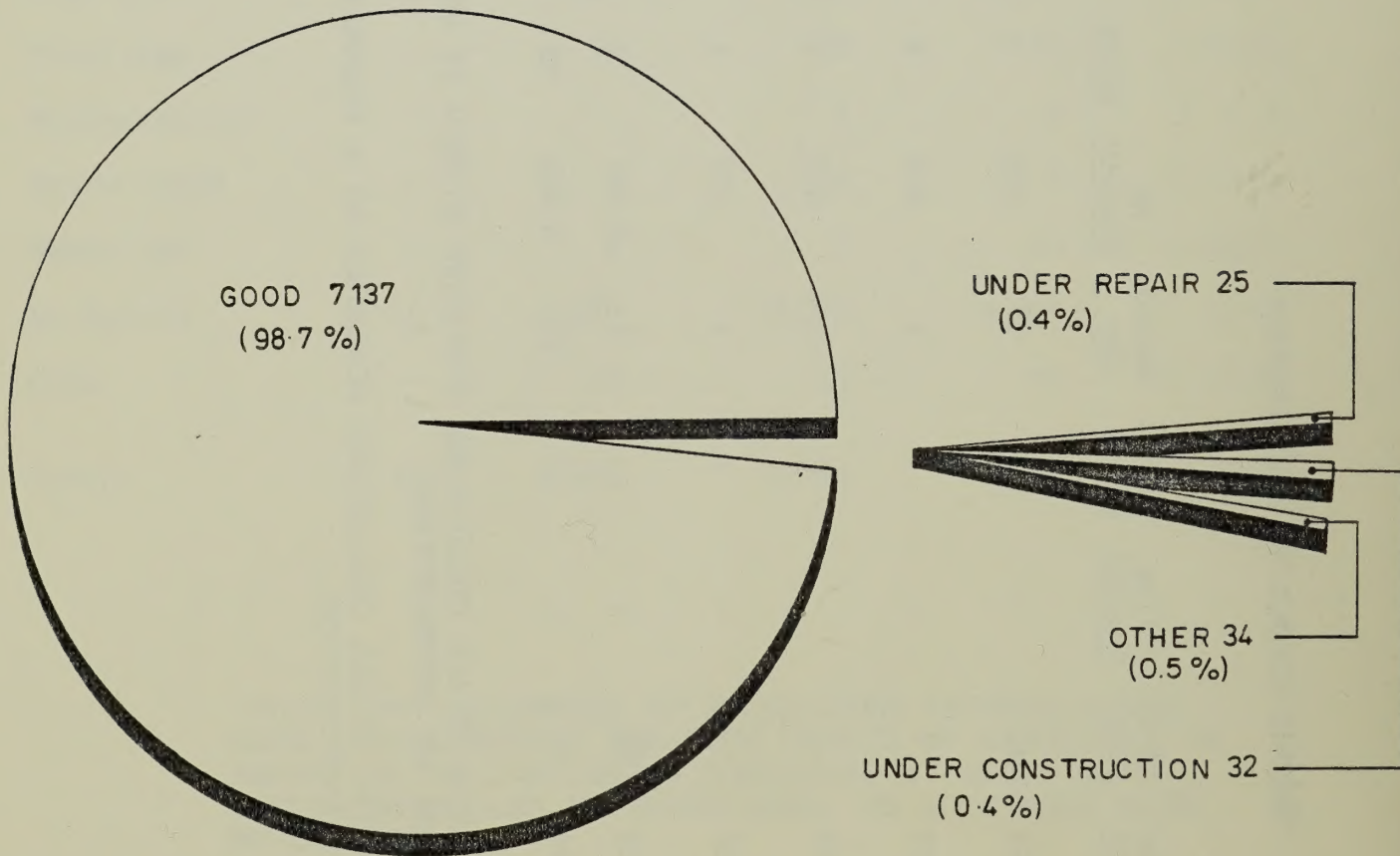
Distance From Intersection	Traffic Signal	Stop Sign	Yield Sign	Police Control	School Guard	School Bus	No Control	Other	Total	%
In Intersection (Within 9 Metres)	1,503	1,272	44	-	5	3	736	9	3,572	49.4
9.1 to 20 Metres	188	129	3	-	1	1	608	2	932	12.9
20.1 to 40 Metres	105	65	2	-	1	2	678	1	854	11.8
40.1 to 60 Metres	36	20	-	-	-	1	372	2	431	6.0
Over 60 Metres	67	52	13	1	-	4	1,294	8	1,439	19.9
	1,899	1,538	62	1	7	11	3,688	22	7,228	100.0

62% OF ALL COLLISIONS OCCURRED WITHIN 20 METRES
OF AN INTERSECTION.

21% OF ALL COLLISIONS OCCURRED AT A SIGNALIZED
INTERSECTION.

Exhibit 6-12

ROAD CONDITION



99% OF ROADWAYS ON WHICH COLLISIONS OCCURRED WERE IN GOOD CONDITION (I.E. NOT UNDER REPAIR OR UNDER CONSTRUCTION AT THE TIME OF THE COLLISION)

Exhibit 6-13 FIXED OBJECTS STRUCK VERSUS ROAD LOCATION

Object Struck	Non-Intersection Related	Intersection In	ROAD LOCATION				Total	Other	Bridge	Underpass	Overpass	Single Motor Vehicle (%)	
			Intersection	Private Drive	Crossing	Tunnel or							
Restraining Barrier	81	13	8	2	-	-	7	-	-	-	-	111 (9.9)	82.0
Rigid Pole	173	61	53	28	-	-	2	-	-	-	-	317 (28.3)	78.6
Break-away Pole	25	9	13	-	1	1	-	-	-	-	-	49 (4.4)	75.5
Tree Post (Sign; Parking Meter)	78	10	4	5	-	-	1	-	-	-	-	98 (8.7)	89.8
Fence	46	16	18	6	-	-	1	-	-	-	-	87 (7.8)	75.9
Culvert	42	11	14	5	-	1	-	-	-	-	-	73 (6.5)	71.2
Bridge Support	14	2	2	4	-	-	-	-	-	-	-	22 (2.0)	100.0
Rock Face	1	-	-	-	-	5	-	-	-	-	-	6 (0.5)	100.0
Snowbank or Drift	5	1	1	-	-	-	2	-	-	-	-	9 (0.8)	66.7
Ditch	8	4	2	-	-	-	-	-	-	-	-	14 (1.3)	42.9
Curb	76	12	12	11	-	1	-	-	-	-	-	112 (10.0)	92.9
Crash Cushion	34	12	25	5	-	1	-	-	-	-	-	77 (6.9)	55.8
Building or Wall	3	2	-	-	-	-	-	-	-	-	-	5 (0.5)	100.0
Other	27	7	6	4	-	-	-	-	-	-	-	44 (3.9)	70.5
	60	16	11	6	4	-	-	-	-	-	-	97 (8.7)	82.5
Total	673	176	169	76	5	9	13	-	-	-	-	1,121 (100.0)	79.1

28% OF FIXED OBJECTS STRUCK BY
ALL VEHICLES WERE RIGID POLES.
79% OF COLLISIONS INVOLVING FIXED OBJECTS
WERE SINGLE MOTOR VEHICLE COLLISIONS.

Exhibit 6-14

FIXED OBJECT VERSUS CLASS OF COLLISION

<u>Object Struck</u>	<u>Fatal</u>	<u>Personal Injury</u>	<u>Property Damage Only</u>	<u>Total</u>	<u>% Fatal or Injury</u>
Restraining Barrier	-	50	61	111	45.1
Rigid Pole	2	139	176	317	44.5
Breakaway Pole	-	20	29	49	40.8
Tree	1	41	56	98	42.9
Post, Sign, Parking Meter	-	21	66	87	24.1
Fence	1	18	54	73	26.0
Culvert	-	9	13	22	40.9
Bridge Support	-	4	4	8	50.0
Rock Face	-	2	5	7	28.6
Snowbank or Drift	-	9	5	14	64.3
Ditch	-	60	52	112	53.6
Curb	-	38	39	77	49.4
Crash Cushion	-	2	3	5	40.0
Building or Wall	-	17	27	44	38.6
Other	1	27	69	97	28.9
Total	5	457	659	1,121	41.2
Single Motor Vehicle Collisions	4 (0.4%)	351 (39.6%)	532 (60.0%)	887 (100.0%)	
Collisions Involving Two or More Vehicles	1 (0.4%)	106 (45.3%)	127 (54.3%)	234 (100.0%)	

THE PROBABILITY OF INJURY OR DEATH IS HIGHEST FOR COLLISIONS IN WHICH A SNOWBANK OR BRIDGE SUPPORT IS HIT.

THE CHANCE OF INJURY OR DEATH IN A COLLISION IN WHICH A FIXED OBJECT IS HIT IS HIGHER WHEN TWO OR MORE VEHICLES ARE INVOLVED.

FOUR SINGLE MOTOR VEHICLE COLLISIONS IN WHICH FIXED OBJECTS WERE STRUCK RESULTED IN FATALITIES.

Chapter Seven

Locations

General

Locations that have high numbers or rates of collision occurrences have received regular attention by roadway authorities in the Region and countermeasures are constantly being implemented on existing facilities and incorporated into the design of new facilities. However, physical alterations are not effective in preventing the majority of traffic collisions as these are the direct result of driver or pedestrian error.

Area Municipality

In general, the collision rate increased with increasing municipality size (Exhibit 7-1).

High Frequency Intersection Locations

Exhibit 7-2 represents a list of the 55 locations which experienced the highest number of collision occurrences in 1984. All 1984 collisions occurring at traffic signals were subjected to the control chart analysis technique (Exhibit 7-3). Additional information including collision data from previous years is included with this exhibit.

Exhibit 7-4 shows the relative number of collisions and collision rates for selected groups of signalized intersections.

These exhibits do not necessarily represent priority lists for improvements as other factors have to be taken into account such as cost-benefit considerations or the deployment of other countermeasure opportunities which may be more cost-effective.

In many cases, these locations are already under consideration for various forms of improvement on a priority basis.

High Frequency Road Section Locations

Exhibits 7-5, 7-6 and 7-7 portray arterial roadway sections within the City of Hamilton which have the highest collision rates. The criteria for reporting is collisions per million vehicle kilometres travelled per annum. Exhibit 7-5 evaluates roadway sections including all collisions along the roadway. Exhibit 7-6 demonstrates collision rates on roadway sections excluding collisions occurring within 9 metres of a signalized intersection. Exhibit 7-7 shows collision rates on roadway sections excluding collisions occurring at all intersections, signalized or non-signalized. Exhibit 7-8 presents a summary of collision rates for selected groups and subcategories of the arterial system.

The trends over the past eight years are interesting to note when reviewing Exhibit 7-7. As the overall number of collisions within the City of Hamilton and Region has been dropping since 1977, with traffic volumes relatively constant, collision rates on roadway sections show a parallel decline.

Exhibit 7-1

COLLISIONS VS AREA MUNICIPALITY

Municipality	<u>Class of Collision</u> (a)				1984 Collision Rate per 1,000 Pop. (b)
	Fatal	Non-Fatal Injury	Property Damage Only	All Collisions	
Ancaster	1	55	140	196	13.3
Dundas	-	100	165	265	13.5
Flamborough	1	103	156	260	10.6
Glanbrook	-	52	64	116	12.1
City of Hamilton	15	2,185	3,597	5,797	18.8
Stoney Creek	1	231	362	594	15.8
Total for the Regional Municipality of Hamilton- Wentworth	18	2,726	4,484	7,228	17.4

COLLISION RATE IN TERMS OF COLLISIONS PER
1,000 POPULATION GENERALLY INCREASED WITH
INCREASED MUNICIPALITY SIZE.

(a) Collisions reported to the Hamilton-Wentworth Regional Police only; areas patrolled by the Provincial Police (e.g. Kings Highways) are not included.

(b) 1982 Regional Assessment Office population figures used.

Exhibit 7-2
INTERSECTIONS WITH HIGHEST NUMBER OF COLLISIONS IN 1984 (a)

	<u>Intersection</u>	<u>Type of Traffic Control</u>	<u>Number of Collisions</u>	<u>5 Yr. Avg.</u>
1.	Queenston/Centennial	Traffic Signal	31	24.2
2.	Main/John	Traffic Signal	21	20.0
3.	King/Wellington	Traffic Signal	19	11.2
4.	Barton/Centennial	Traffic Signal	18	14.8
5.	Main/Victoria	Traffic Signal	18	22.0
6.	York/Queen	Traffic Signal	18	12.0
7.	Main/Dundurn	Traffic Signal	17	18.4
8.	Queenston/Nash	Traffic Signal	16	18.8
9.	Fennell/Upper Gage	Traffic Signal	15	16.2
10.	Main/Hess	Traffic Signal	15	7.8
11.	Mohawk/Upper James	Traffic Signal	15	14.4
12.	Rymal/Upper James	Traffic Signal	15	12.2
13.	Fennell/Upper Ottawa	Traffic Signal	14	13.4
14.	Caroline/Charlton	1-Way Stop (2 One-Way Streets)	14	10.8
15.	Mohawk/Upper Ottawa	Traffic Signal	14	13.0
16.	Mohawk/Upper Paradise	Traffic Signal	14	15.6
17.	Main/Bay	Traffic Signal	13	13.6
18.	Barton/Kenora	Traffic Signal	12	8.8
19.	Barton/Woodward	Traffic Signal	12	16.2
20.	Hunter/John	Traffic Signal	12	10.8
21.	King/James	Traffic Signal	12	11.6
22.	Barton/Parkdale	Traffic Signal	11	10.6

	<u>Intersection</u>	<u>Type of Traffic Control</u>	<u>Number of Collisions</u>	<u>5 Yr. Avg.</u>
23.	Barton/Wellington	Traffic Signal	11	8.0
24.	Burlington/Ottawa	Traffic Signal	11	8.0
25.	Cootes/Olympic	Traffic Signal	11	10.0
26.	King/Centennial	Traffic Signal	11	15.8
27.	King/Parkdale	Traffic Signal	11	9.8
28.	Main/James	Traffic Signal	11	10.8
29.	Mtn. Brow/Kenilworth Access	Traffic Circle	11	4.4
30.	Sherman Access/Kenilworth Access	One-Way Stop	11	7.6
31.	King/Kenilworth	Interchange	11	6.2
32.	Barton/John	Traffic Signal	10	13.0
33.	Barton/Hughson	Two-Way Stop	10	5.6
34.	Cannon/Wellington	Traffic Signal	10	9.0
35.	King/Dundurn	Traffic Signal	10	13.4
36.	King/Queen	Traffic Signal	10	9.4
37.	Limeridge/Upper James	Traffic Signal	10	9.4
38.	Limeridge/Upper Gage	Traffic Signal	10	10.0
39.	Main/Longwood	Traffic Signal	10	9.2
40.	Main/Queen	Traffic Signal	10	7.4
41.	Mohawk/Garth	Traffic Signal	10	9.6
42.	Walnut/Young	One-Way Stop	10	5.4
43.	Aberdeen/Dundurn	Traffic Signal	9	12.0
44.	Barton/Robins	Private Driveway	9	10.8
45.	Cannon/Gage	Traffic Signal	9	8.4
46.	Cannon/James	Traffic Signal	9	9.0
47.	Cannon/Ferguson	Two-Way Stop	9	6.6

	<u>Intersection</u>	<u>Type of Traffic Control</u>	<u>Number of Collisions</u>	<u>5 Yr. Avg.</u>
48.	Charlton/Sherman Access	Traffic Signal	9	14.2
49.	Delawana/Centennial	Traffic Signal	9	8.6
50.	Fennell/Upper Wentworth	Traffic Signal	9	11.8
51.	Governors/Main	Traffic Signal	9	6.2
52.	Gray/Hwy. 8	Traffic Signal	9*	9.4*
53.	King/John	Traffic Signal	9	7.8
54.	Main/Parkdale	Traffic Signal	9	9.0
55.	Main/Wellington	Traffic Signal	9	12.0
56.	Queensdale/Upper Gage	Traffic Signal	9	11.2
57.	York/Locke	Traffic Signal	9	11.8

(a) Only collisions occurring within 31 feet (9.5 m) of the intersection are defined as being "in" the intersection, and are included on this list.

* Only collisions as reported to the Hamilton-Wentworth Regional Police Department.

Exhibit 7-3

SIGNALIZED INTERSECTIONS WITH HIGHEST COLLISION RATES IN 1984 *

Intersection	R_L R_C	R_L		R_C	Number of Collisions					5 YR AVG.
		(a)			(b)					
		R_L	R_C		1984 (c)					
					AWDT	1984	1983	1982	1981	
1. Queenston/Centennial	2.20	1.95	0.89		47,177	31	19	16	26	24.2
2. Fennell/Gage	1.86	1.82	0.98		24,242	15	20	13	18	16.2
3. Fennell/Ottawa	1.85	1.83	0.99		24,303	14	14	10	15	13.4
4. Limeridge/Gage (1)	1.79	1.89	1.06		18,325	10	4	8	5	7.2
5. Hunter/Hess	1.72	2.00	1.17		9,143	6	9	5	5	7.4
6. King/Wellington	1.62	1.48	0.91		33,116	19	7	6	13	11.2
7. Main/John	1.61	1.44	0.90		41,428	21	16	17	20	20.0
8. Rymal/James	1.59	1.51	0.95		30,556	15	11	14	11	12.2
9. Cootes/Olympic (2)	1.59	1.60	1.01		18,862	11	9	6	3	5.8
10. Governors/Ogilvie (Dundas)	1.58	1.71	1.08		13,406	8	7	1	7	6.0
11. Mohawk/Paradise	1.57	1.51	0.96		28,844	14	15	20	16	15.6
12. Barton/John	1.54	1.57	1.02		18,177	10	18	9	13	13.0
13. Hunter/John	1.53	1.51	0.99		21,184	12	10	7	11	10.8
14. York/Queen	1.47	1.33	0.91		37,981	18	8	10	13	12.0
15. Limeridge/Garth	1.43	1.51	1.06		18,315	8	6	3	3	5.2
16. Charlton/Hess	1.41	1.64	1.16		9,900	5	7	2	4	4.4
17. Charlton/Sherman Access	1.41	1.45	1.03		16,245	9	12	16	14	14.2
18. Queenston/Nash	1.40	1.29	0.92		34,208	16	21	15	16	18.8
19. Governors/Main (Dundas)	1.37	1.40	1.02		18,723	9	3	5	7	6.2
20. Queensdale/Gage	1.35	1.38	1.02		17,636	9	11	2	19	11.2
21. Main/Victoria	1.31	1.17	0.89		45,551	18	14	23	31	22.0
22. Main/Hess	1.28	1.17	0.91		36,301	15	3	7	9	7.8

Number of Collisions

Intersection	R_L R_C	(a)		(b)		1984 ^(c)		Number of Collisions				5 YR AVG.
		R_L		R_C		AWDT		1984	1983	1982	1981	
23. Britannia/Kenilworth	1.27	1.31	1.27	1.27	1.27	17,750	17,750	8	4	4	7	5.6
24. Greenhill/Mt. Albion	1.26	1.34	1.06	1.06	1.06	15,331	15,331	7	4	8	5	5.8
25. Fennell/Wentworth	1.26	1.27	1.00	1.00	1.00	22,354	22,354	9	20	10	11	11.8
26. Main/Parkdale	1.26	1.27	1.01	1.01	1.01	20,809	20,809	9	6	9	13	9.0
27. Barton/Kenora	1.25	1.18	0.95	0.95	0.95	28,735	28,735	12	9	5	12	8.8
28. Barton/Wellington	1.23	1.19	0.96	0.96	0.96	22,972	22,972	11	5	12	6	8.0
29. Aberdeen/Dundurn	1.17	1.16	0.99	0.99	0.99	20,810	20,810	9	12	14	13	12.0
30. Barton/Centennial	1.15	1.00	0.87	0.87	0.87	47,191	47,191	18	6	13	15	14.8
31. Barton/Woodward	1.15	1.07	0.93	0.93	0.93	30,239	30,239	12	20	18	13	16.2
32. King NB/James	1.15	1.07	0.93	0.93	0.93	31,240	31,240	12	9	13	9	11.6
33. Main/Dundurn	1.14	1.00	0.88	0.88	0.88	43,955	43,955	17	22	17	18	18.4
34. King/Parkdale	1.14	1.09	0.95	0.95	0.95	30,491	30,491	11	8	10	11	9.8
35. Barton/Frederick	1.13	1.13	1.01	1.01	1.01	18,467	18,467	8	6	1	8	6.8
36. Burlington/Ottawa	1.13	1.07	0.95	0.95	0.95	32,044	32,044	11	6	5	6	8.0
37. Limeridge/James	1.13	1.08	0.96	0.96	0.96	27,359	27,359	10	10	11	11	9.4
38. Mohawk/James	1.13	1.01	0.89	0.89	0.89	47,746	47,746	15	13	15	18	14.4
39. Wilson/John	1.10	1.10	1.00	1.00	1.00	21,356	21,356	8	6	8	5	6.6
40. Lawrence/Rosedale	1.05	1.15	1.09	1.09	1.09	12,734	12,734	5	3	5	2	4.2
41. Mohawk/Garth	1.05	0.99	0.95	0.95	0.95	26,138	26,138	10	7	4	12	9.6
42. Cannon/Wellington	1.04	0.98	0.95	0.95	0.95	25,614	25,614	10	11	5	9	9.0

Intersection	R_L R_C	(a) R_L	(b) R_C	1984 ^(c) AWDT	Number of Collisions					5 YR AVG.
					1984	1983	1982	1981		
43. Barton/Sherman	1.01	0.99	0.98	21,343	8	1	9	7	6.0	
44. King/Cochrane	1.01	1.00	0.98	22,502	8	4	8	10	7.6	
45. Main/Bay	1.00	0.90	0.90	40,726	13	12	11	14	13.6	
46. Mohawk/Gage	1.00	0.98	0.98	27,882	8	8	6	8	10.8	

- (1) Signal installation date 83 06 20
 (2) Signal installation date 82 11 02

NOTES:

(a) R_L is the number of collisions per million vehicles entering occurring within 31 feet of an individual intersection in 1984.

(b) R_C is a volume-adjusted critical rate. If R_L exceeds R_C (i.e. R_L is greater than 1.00), one can state R_C

with 95 percent confidence that the collision rate at the intersection in question is significantly higher than would normally be expected.

$$R_C = R_a + K \sqrt{\frac{R_a}{m} - \frac{0.5}{m}} \quad \text{where } R_a = \text{systemwide average collision rate for all traffic signal locations (0.60 collisions per million vehicle entries in 1984.)}$$

K = constant = 1.65 (for 95% confidence level)

m = vehicle exposure at the location in million vehicles entering per year $\frac{(AWDT \times 349.6)}{10^6}$

(c) $AWDT$ - Average Weekday Daily Traffic; $AADT$ - Average Annual Daily Traffic.

(*) Note: Rates presented are for 1984 only. Rates may fluctuate significantly from year to year. Therefore, caution should be exercised when drawing conclusions from the above table.

Exhibit 7-4

**OVERALL COLLISION RATES
FOR SELECTED GROUPS OF SIGNALIZED INTERSECTIONS**

<u>Intersections Included</u>	<u>Data for 1984 Only</u>		<u>Data for 1980-1984</u>	
	<u>Avg. No. of Collisions Per Year</u>	<u>Rate (Collisions/ Million Vehicles Entering)</u>	<u>Avg. No. of Collisions Per Year</u>	<u>Rate (Collisions/ Million Vehicles Entering)</u>
All intersections	4.91	0.60	5.75	0.70
Intersections of one-way streets with one-way streets	5.57	0.64	6.00	0.69
Intersections of one-way streets with two-way streets	3.94	0.48	4.77	0.58
Intersections of two-way streets with two-way streets	4.90	0.61	5.94	0.74
Central business district intersections	5.29	0.60	5.98	0.68
C.B.D. fringe or industrial intersections	4.85	0.60	5.55	0.68
Suburban shopping-type intersections	5.78	0.63	6.83	0.74
Residential area intersections	3.86	0.55	4.50	0.64
All lower city intersections	4.98	0.58	5.76	0.67
All mountain intersections	5.02	0.67	6.24	0.83

THERE HAVE BEEN NO MARKED CHANGES IN THE OVERALL COLLISION RATES FROM 1983 TO 1984.

HOWEVER, THERE HAVE BEEN SOME CHANGES IN THE INDIVIDUAL SUBSECTIONS.

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1980 - 1984
CITY OF HAMILTON ARTERIALS (a)
(ALL INTERSECTIONS INCLUDED)

Arterial Street	From	To	Number of Collisions	R _L	R _C	Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
1. Kenilworth	Main	Barton	267.5	11.58	5.02	2.31	1.031	12,820	4.62	11.90
2. Charlton	James	John	47.0	15.67	6.90	2.27	.244	7,000	0.60	17.50
3. Barton	James	Wellington	238.0	11.04	5.06	2.18	.836	14,753	4.31	10.44
4. Barton	Ottawa	Kenilworth	295.0	9.19	4.83	1.90	.860	21,355	6.42	9.42
5. John	St. Josephs	King	238.5	9.33	4.96	1.88	.976	14,970	5.11	8.12
6. Barton	Gage	Ottawa	277.0	8.86	4.84	1.83	.860	20,775	6.25	7.04
7. Barton	Wentworth	Sherman	223.5	9.03	4.98	1.81	.842	16,817	4.95	8.28
8. Barton	Wellington	Wentworth	206.5	8.48	4.99	1.70	.872	15,987	4.87	6.26
9. John	King	Barton	105.5	9.17	5.52	1.66	.872	7,540	2.30	6.09
10. Queen	Aberdeen	King	171.5	8.41	5.10	1.65	1.238	9,430	4.08	7.60
11. Cannon	James	Wellington	204.0	8.08	4.96	1.63	.854	16,928	5.05	8.02
12. Garth	Limeridge	Mohawk	40.0	10.67	6.64	1.61	.457	4,700	0.75	6.67
13. Barton	Queen	James	96.5	8.73	5.56	1.57	.872	7,260	2.21	9.28
14. James	King	Barton	124.0	8.29	5.32	1.56	.860	9,950	2.99	7.36
15. Charlton	Queen	James	111.0	8.38	5.41	1.55	.823	9,213	2.65	9.25
16. Main	James	Wellington	310.5	7.22	4.68	1.54	.866	28,393	8.60	7.03
17. Barton	Sherman	Gage	223.5	7.45	4.87	1.53	.872	19,667	6.00	6.83
18. James	Freeman	King	190.0	7.27	4.94	1.47	1.205	12,410	5.23	6.50
19. Fennell	U. Gage	U. Ottawa	120.5	7.68	5.28	1.45	.824	10,895	3.14	8.12
20. Fennell	U. Ottawa	U. Kenilworth	57.0	8.57	6.02	1.42	.878	4,326	1.33	7.14

(a) See Notes, Page 101

Arterial Street	From	To	Number of Collisions	R _L		Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
				R _C	R _L					
21. Parkdale	Main	Barton	193.5	4.90	6.85	1.40	1.013	15,952	5.65	5.75
22. Bay	Herkimer	King	107.5	5.33	7.26	1.36	.924	9,150	2.96	6.25
23. U. Gage	Fennell	Concession	143.0	5.06	6.57	1.30	1.043	11,930	4.35	6.09
24. Main	Queen	James	265.0	4.67	6.09	1.30	.830	29,980	8.70	7.18
25. Britannia	Barons	Strathearne	77.5	5.58	7.18	1.29	.488	12,685	2.16	3.70
26. Barton	Nash	Centennial	209.0	4.80	6.15	1.28	.836	23,277	6.80	5.96
27. Victoria	Stinson	King	79.0	5.54	7.02	1.27	.488	13,210	2.25	5.33
28. Mohawk	U. Paradise	Garth	180.5	4.88	6.13	1.26	.839	20,095	5.89	7.22
29. Ottawa	Main	Barton	145.0	5.02	6.28	1.25	1.031	12,820	4.62	4.65
30. Fennell	U. Wentworth	U. Sherman	133.0	5.07	6.24	1.23	.854	14,255	4.26	4.69
31. Main	Wellington	Wentworth	244.0	4.68	5.71	1.22	.854	28,636	8.55	4.74
32. King	James	Wellington	185.5	4.84	5.87	1.21	.878	20,582	6.32	5.14
33. Wilson	James	Wellington	137.0	5.04	6.09	1.21	.860	14,965	4.50	4.78
34. U. Wentworth	Mohawk	Fennell	62.5	5.74	6.94	1.21	1.037	4,955	1.80	11.11
35. Queen	King	Barton	65.0	5.66	6.60	1.17	.823	6,830	1.97	7.61
36. Cannon	Sherman	Gage	141.0	5.00	5.86	1.17	.891	15,443	4.81	5.30
37. Charlton	Wellington	Wentworth	92.5	5.31	6.15	1.16	.854	10,085	3.01	5.98
38. Ottawa	Barton	Industrial	160.0	4.90	5.64	1.15	1.279	12,673	5.67	5.03
39. Cannon	Gage	Ottawa	135.5	5.00	5.69	1.14	.866	15,735	4.76	6.30
40. Barton	Kenilworth	Parkdale	305.5	4.53	5.13	1.13	1.525	22,355	11.92	4.03
41. U. Wentworth	Fennell	Concession	57.5	5.75	6.46	1.12	1.031	4,930	1.78	8.99
42. Gage	Lawrence	King	84.0	5.34	5.81	1.09	.982	8,405	2.89	2.77
43. Fennell	U. Sherman	U. Gage	84.0	5.35	5.85	1.09	.781	10,510	2.87	3.48
44. Mohawk	U. Sherman	U. Gage	109.0	5.10	5.38	1.05	.781	14,835	4.05	3.83
45. York	Queen	James	127.0	4.99	5.22	1.05	.921	15,120	4.87	4.41
46. King	Parkdale	Nash	300.5	4.51	4.75	1.05	1.708	21,207	12.66	4.30

Arterial Street	From	To	Number of Collisions	<u>R_L</u>	<u>R_C</u>	Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
47. Wentworth	Charlton	King	56.5	5.95	5.69	1.05	.851	6,375	1.90	7.37
48. Parkdale	Barton	Burlington	185.5	4.93	4.74	1.04	1.421	15,155	7.53	3.52
49. King	Wellington	Wentworth	181.0	4.86	4.75	1.02	.866	24,610	7.45	5.03
50. Cannon	Queen	James	130.0	4.98	4.95	1.01	.848	17,592	5.22	4.02
51. U. Wellington	Fennell	Concession	129.0	5.03	4.96	1.01	1.031	14,240	5.13	4.68
52. Bay	King	Barton	56.0	5.63	5.65	1.00	.854	6,660	1.99	5.28

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1980 - 1984
CITY OF HAMILTON ARTERIALS
(SIGNALIZED INTERSECTIONS NOT INCLUDED) (a)

Arterial Street	From	To	Number of Collisions	R _L	R _C	Ratio	Link Length	Link Volume	Link Million Veh-Km	1984 R _L
1. Charlton	James	John	44.0	14.67	4.98	2.95	.244	7,000	0.60	15.00
2. Kenilworth	Main	Barton	218.5	9.46	3.57	2.65	1.031	12,820	4.62	9.31
3. Barton	James	Wellington	171.0	7.94	3.60	2.21	.836	14,753	4.31	7.42
4. Barton	Gage	Ottawa	225.0	7.20	3.43	2.10	.860	20,775	6.25	5.92
5. Barton	Ottawa	Kenilworth	226.0	7.04	3.42	2.06	.860	21,355	6.42	7.32
6. Barton	Queen	James	90.0	8.14	3.99	2.04	.872	7,260	2.21	7.69
7. Barton	Wellington	Wentworth	151.0	6.20	3.54	1.75	.872	15,987	4.87	5.13
8. Barton	Wentworth	Sherman	150.0	6.06	3.53	1.72	.842	16,817	4.95	5.86
9. Britannia	Barons	Strathearne	69.5	6.44	4.00	1.61	.488	12,685	2.16	3.24
10. Barton	Sherman	Gage	162.0	5.40	3.44	1.57	.872	19,667	6.00	5.00
11. Charlton	Queen	James	80.0	6.04	3.87	1.56	.823	9,213	2.65	7.17
12. Ottawa	Main	Barton	115.0	4.98	3.57	1.39	1.031	12,820	4.62	3.46
13. Fennell	U. Gage	U. Ottawa	81.0	5.16	3.77	1.37	.824	10,895	3.14	6.05
14. Fennell	U. Ottawa	U. Kenilworth	39.5	5.94	4.34	1.37	.878	4,326	1.33	4.51
15. Garth	Limeridge	Mohawk	24.0	6.40	4.80	1.33	.457	4,700	0.75	1.33
16. Ottawa	Barton	Industrial	127.0	4.48	3.47	1.29	1.279	12,673	5.67	4.23
17. U. Wentworth	Mohawk	Fennell	48.0	5.33	4.13	1.29	1.037	4,955	1.80	9.44
18. Queen	Aberdeen	King	94.0	4.61	3.63	1.27	1.238	9,430	4.08	4.41
19. Mohawk	U. Paradise	Garth	127.0	4.31	3.45	1.25	.839	20,095	5.89	5.43
20. Fennell	U. Wentworth	U. Sherman	96.0	4.51	3.61	1.25	.854	14,255	4.26	3.76

(a) See Notes, Page 101

Locations

Arterial Street	From	To	Number of Collisions	R _L		Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
				R _L	R _C					
21. John	King	Barton	56.0	4.87	3.96	1.23	.872	7,540	2.30	3.48
22. Cannon	Gage	Ottawa	103.0	4.33	3.55	1.22	.866	15,735	4.76	5.46
23. Cannon	Sherman	Gage	102.0	4.24	3.55	1.19	.891	15,443	4.81	4.37
24. Barton	Nash	Centennial	136.0	4.00	3.39	1.18	.836	23,277	6.80	3.09
25. James	Freeman	King	108.0	4.13	3.51	1.18	1.205	12,410	5.23	3.82
26. Parkdale	Main	Barton	116.0	4.11	3.47	1.18	1.013	15,952	5.65	3.19
27. King	Kenilworth	Parkdale	206.5	3.73	3.20	1.17	1.513	20,922	11.07	4.43
28. Queenston	Nash	Hamilton City Limit	144.0	3.91	3.36	1.16	.823	25,585	7.36	3.40
29. James	King	Barton	66.0	4.41	3.80	1.16	.860	9,950	2.99	5.69
30. Barton	Kenilworth	Parkdale	215.0	3.61	3.18	1.14	1.525	22,355	11.92	2.77
31. King	Gage	Main	83.0	4.13	3.64	1.13	.610	18,830	4.02	2.24
32. King	Wellington	Wentworth	140.0	3.76	3.35	1.12	.866	24,610	7.45	4.03
33. Wentworth	Charlton	King	43.5	4.58	4.09	1.12	.851	6,375	1.90	5.79
34. Wentworth	Barton	Burlington	46.0	4.47	4.03	1.11	1.031	5,725	2.06	3.88
35. Gage	Lawrence	King	61.0	4.22	3.82	1.10	.982	8,405	2.89	2.08
36. Cannon	James	Wellington	98.0	3.88	3.52	1.10	.854	16,928	5.05	4.95
37. Mohawk	U. Sherman	U. Gage	80.0	3.95	3.63	1.09	.781	14,835	4.05	2.96
38. Main	James	Wellington	154.0	3.58	3.30	1.08	.866	28,393	8.06	3.60
39. Sherman	Main	King	33.0	4.62	4.29	1.08	.427	9,600	1.43	4.20
40. U. Wellington	Fennell	Concession	95.0	3.70	3.52	1.05	1.031	14,240	5.13	3.51
41. U. James	Limeridge	Mohawk	138.0	3.50	3.33	1.05	1.049	21,490	7.88	3.68
42. Main	Gage	Ottawa	127.0	3.46	3.36	1.03	.866	24,290	7.35	2.99
43. King	Parkdale	Nash	203.0	3.21	3.16	1.02	1.708	21,207	12.66	3.00
44. Parkdale	Barton	Burlington	128.0	3.40	3.35	1.01	1.421	15,155	7.53	2.66
45. Main	Sherman	Gage	122.0	3.37	3.36	1.00	.872	23,767	7.25	4.55

ROADWAY SECTIONS WITH THE HIGHEST COLLISION RATES, 1980 - 1984
CITY OF HAMILTON ARTERIALS
(INTERSECTIONS NOT INCLUDED) (a)

1984 Hamilton - Wentworth Collision Report

Locations

Arterial Street	From	To	Number of Collisions	R _L	R _C	Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
1. Barton	Nash	Centennial	136.0	4.00	2.20	1.82	.836	23,277	6.80	3.09
2. Barton	Ottawa	Kenilworth	129.0	4.02	2.22	1.81	.860	21,355	6.42	4.67
3. Fennell	U. Gage	U. Ottawa	67.0	4.27	2.48	1.72	.824	10,895	3.14	6.05
4. Kenilworth	Main	Barton	86.0	3.72	2.33	1.60	1.031	12,820	4.62	3.90
5. Barton	Gage	Ottawa	111.0	3.55	2.23	1.59	.860	20,775	6.25	2.88
6. Barton	James	Wellington	77.0	3.57	2.36	1.51	.836	14,753	4.31	2.78
7. Mohawk	U. Paradise	Garth	99.0	3.36	2.25	1.49	.839	20,095	5.89	4.75
8. Garth	Limeridge	Mohawk	17.0	4.53	3.17	1.43	.457	4,700	0.75	1.33
9. U. James	Limeridge	Mohawk	121.0	3.07	2.16	1.42	1.049	21,490	7.88	3.30
10. Main	James	Wellington	128.0	2.98	2.13	1.40	.866	28,393	8.60	2.91
11. Parkdale	Main	Barton	86.0	3.04	2.26	1.35	1.013	15,952	5.65	2.30
12. Charlton	James	John	13.0	4.33	3.28	1.32	.244	7,000	0.60	5.00
13. Barton	Wentworth	Sherman	75.0	3.03	2.31	1.31	.842	16,817	4.95	2.22
14. Queenston	Nash	Hamilton City Limit	101.0	2.74	2.18	1.26	.823	25,585	7.36	2.72
15. Ottawa	Barton	Industrial	80.0	2.82	2.26	1.25	1.279	12,673	5.67	2.82
16. Barton	Wellington	Wentworth	69.0	2.83	2.31	1.23	.872	15,987	4.87	1.64
17. Barton	Sherman	Gage	82.0	2.73	2.24	1.22	.872	19,667	6.00	3.50
18. John	King	Barton	36.0	3.13	2.62	1.19	.872	7,540	2.30	2.17
19. Barton	Kenilworth	Parkdale	141.0	2.37	2.04	1.16	1.525	22,355	11.92	1.59
20. Fennell	U. Ottawa	U. Kenilworth	22.0	3.31	2.88	1.15	.878	4,326	1.33	2.26

(a) See Notes, Page 101

Arterial Street	From	To	Number of Collisions	R _L	R _C	Ratio	Link Length	Link Volume	Million Veh-Km	1984 R _L
21. James	King	Barton	43.0	2.88	2.50	1.15	.860	9,950	2.99	3.34
22. James	Freeman	King	68.0	2.60	2.29	1.14	1.205	12,410	5.23	2.10
23. U. Wentworth	Mohawk	Fennell	28.0	3.11	2.73	1.14	1.037	4,955	1.80	5.56
24. King	Parkdale	Nash	145.0	2.29	2.03	1.13	1.708	21,207	12.66	2.37
25. Queenston	Parkdale	Nash	129.0	2.24	2.05	1.09	1.623	20,286	11.51	1.74
26. Wentworth	King	Barton	28.0	2.89	2.69	1.07	.820	6,765	1.94	1.03
27. York	Queen	James	59.0	2.42	2.31	1.05	.921	15,120	4.87	2.26
28. Ottawa	Main	Barton	56.0	2.42	2.33	1.04	1.031	12,820	4.62	1.95
29. Fennell	U. Wentworth	U. Sherman	52.0	2.44	2.36	1.03	.854	14,255	4.26	2.11
30. Gage	Lawrence	King	37.0	2.56	2.52	1.02	.982	8,405	2.89	1.38
31. King	James	Wellington	71.0	2.25	2.22	1.01	.878	20,582	6.32	2.22
32. Main	Queen	James	93.0	2.14	2.13	1.00	.830	29,980	8.70	2.64

NOTES Re: Collision Rates on Roadway Sections

- (a) Exhibit 7-5 includes all collisions on an arterial roadway section. If the roadway section ends at an intersection, signalized or unsignalized, one-half the number of collisions occurring at the intersection is included.
- (b) Exhibit 7-6 includes all collisions on an arterial roadway section excluding those which occur within nine metres of a signalized intersection. If the roadway section ends at an unsignalized intersection, one-half the number of collisions occurring at the intersection is included.
- (c) Exhibit 7-7 includes only collisions on an arterial roadway section which occur greater than nine metres from any intersection. That is, no collisions referenced to an intersection, signalized or unsignalized, are included.
- (d) R_L is the collision rate for the roadway section expressed as collisions per million vehicle kilometres travelled per annum.
- (e) R_C is a volume-adjusted critical rate. If R_L exceeds R_C (i.e. R_L is greater than 1.00), one can

state with 95 percent confidence that the collision rate for the roadway section in question is significantly higher than would normally be expected.

$$R_C = R_a + K \sqrt{\frac{R_a}{m}} - \frac{0.5}{m}$$

where R_a = systemwide average collision rate for all roadway sections (3.66 collisions per million vehicle kilometers in 1980-1984 for Exhibit 7-5;
2.47 collisions per million vehicle kilometres in 1980-1984 for Exhibit 7-6; 1.50 collisions per million vehicle kilometres in 1980-1984 for Exhibit 7-7).

K = constant = 1.65 (for 95% confidence level)

m = vehicle exposure for the individual roadway section in million vehicle kilometres per year
 $(AWDT \times \frac{349.6 \times \text{Section Length}}{10^6})$

- (f) AWDT - Average Weekday Daily Traffic

Exhibit 7-8

**ARTERIAL ROADWAY SECTIONS
COLLISION RATES
FOR SELECTED GROUPS**

<u>Category</u>	Collision Rate (Collisions Per Million Vehicle Kilometres)		
	<u>Including All Intersections</u>	<u>Signalized Intersections Not Included</u>	<u>Intersections Not Included</u>
All Arterials 1984	3.34	2.31	1.42
All Arterials 1983	3.34	2.30	1.38
All Arterials 1982	3.59	2.47	1.48
All Arterials 1981	4.04	2.69	1.66
All Arterials 1980	4.00	2.65	1.61
All Arterials 1979	4.33	2.90	1.76
All Arterials 1978	4.06	2.77	1.63
All Arterials 1977	4.74	3.25	2.01
All Arterials 1980 - 84	3.66	2.48	1.51

ROADWAY SECTION COLLISION RATES, INCLUDING ALL INTERSECTIONS, HAVE DISPLAYED A DECLINE FROM 1977 - 1984.

ROADWAY SECTION COLLISION RATES, EXCLUDING SIGNALIZED INTERSECTIONS, HAVE DISPLAYED A DECLINE FROM 1977 - 1984.

ROADWAY SECTION COLLISION RATES, EXCLUDING THE EFFECTS OF ALL INTERSECTIONS, HAVE DISPLAYED A DECLINE FROM 1977 - 1984.

Appendix

Exhibit A-1

CAUSES OF DEATH 1980 (1)

<u>Cause</u>	<u>Rate/100,000 Population</u>	
	<u>Canada</u>	<u>Ontario</u>
Diseases of the Heart and Circulatory Diseases	323.6	345.9
All Malignant Neoplasms	165.2	167.0
All Accidents and Adverse Effects (Including Late Effects)	65.7 ⁽²⁾	56.9 ⁽²⁾
Respiratory Diseases (Excluding Infections and Parasitic Diseases)	46.7	46.5
Diabetes Mellitus	12.0	12.0
Chronic Liver Disease and Cirrhosis	11.2	11.3
Causes of Perinatal Mortality Excluding Stillbirths	6.9	6.2
Congenital Anomalies	6.7	6.1
All Other Causes Not Specified in the Above List	77.8	79.8
All Causes	715.8	731.7

NOTES: (1) From Statistics Canada, Vital Statistics, Volume III, Mortality, 1979 and 1980, p. 12-15.

(2) Motor Vehicle Collisions Alone - 22.5 for Canada, 17.8 for Ontario.

Exhibit A-2

**ACCIDENTAL
CAUSES OF DEATH 1980 (1)**

<u>Cause</u>	<u>Number</u>		<u>Death Rate/100,000</u>	
	<u>Canada</u>	<u>Ontario</u>	<u>Canada</u>	<u>Ontario</u>
Traffic Accidents	5,397	1,527	22.5	17.8
Accidental Falls	1,848	663	7.7	7.7
Fires	747	229	3.1	2.7
Drowning	570	150	2.4	1.7
Other Transport	548	194	2.3	2.3
Accidental Poisoning	443	203	1.9	2.4
Suffocation	423	148	1.8	1.7
Motor Vehicle (non-traffic related)	144	57	0.6	0.6
Explosives, Acid, Electricity	117	37	0.5	0.4
Firearms	74	21	0.3	0.2
Lightning	8	3	0.1	0.1
All Other	908	262	3.8	3.1

(1) Statistics Canada, Vital Statistics, Volume III, Mortality, 1979 and 1980, p. 180-183.

Exhibit A-3

**ACCIDENTAL CAUSES
OF DEATH 1980
(14 YRS. OF AGE AND UNDER) (1)**

<u>Cause</u>	<u>Number of Fatalities In Canada</u>
Traffic Accidents	559
Fires	187
Drowning	171
Suffocation	98
Other Transport	35
Accidental Falls	35
Firearms	21
Motor Vehicle (Non-Traffic Related)	21
Accidental Poisoning	12
Explosives, Acid, Electricity	9
Lightning	1
All Other	147

(1) Statistics Canada, Volume III, Mortality, 1979 and 1980, p. 104-106.

Exhibit A-4

POPULATION AND REGISTRATION

Year	Population	Motor Vehicle Registration (a)		Ratio: Motor Vehicle Registration to Population
	Hamilton	Ontario	Hamilton	
1950	n/a	1,104,080	47,043	
1951	201,296	1,205,098	50,648	0.25
1952	210,060	1,291,753	55,169	
1953	216,921	1,406,119	59,808	
1954	222,907	1,489,980	62,728 (b)	
1955	225,608	1,617,853	67,497	
1956	233,019	1,710,240	70,034 (b)	0.30
1957	243,097	1,793,499	72,156	
1958	251,256	1,868,922	75,763	
1959	258,576	1,973,737	80,365	
1960	263,750	2,062,484	82,823	
1961	266,707	2,126,270	85,667	0.32
1962	268,908	2,177,148	83,779	
1963	264,706	2,268,320	89,005	
1964	278,260	2,381,219	93,208	
1965	283,099	2,516,680	102,171	
1966	285,649	2,643,474	107,506	0.38
1967	291,536	2,736,366	107,521	
1968	293,397	2,869,588	116,452	
1969	296,875	2,953,789	116,135	
1970	298,755	3,047,599	114,760	
1971	303,177	3,209,862	120,727	0.39
1972	304,391	3,382,497	134,623 (b)	
1973	305,382	3,583,379	140,687	
1974	401,932 (e)	3,891,603	154,886 (d)	
1975	408,466 (e)	4,079,108	162,348 (d)(g)	
1976	409,331 (e)	4,089,954 (c)	162,780 (d)	0.52 (f)
1977	411,358 (e)	4,274,410 (c)	170,122 (d)	
1978	407,486 (e)	n/a	228,149 (h)	
1979	407,758 (e)	n/a	190,884 (h)	
1980	410,503 (e)	n/a	230,459 (h)	
1981	n/a	n/a	277,813 (h)	0.68 (j)
1982	n/a	n/a	296,288 (h)	

NOTES:

- (a) Registration is for all vehicles including automobiles, station wagons and commercial vehicles. Sources of data, Hamilton Police Reports, R. L. Polk and Company, Statistics Canada and The Ministry of Transportation and Communications of Ontario.
- (b) Data not available. Estimated from provincial value.
- (c) Estimated by the Ministry of Transportation and Communications.
- (d) Data estimated from provincial value for City of Hamilton only.
- (e) Population for Regional Municipality of Hamilton-Wentworth.
- (f) For City of Hamilton only.
- (g) R. L. Polk estimate for Region of Hamilton-Wentworth for 1975 - 180,084.
- (h) Ministry of Transportation and Communications estimate for Region based on licence sales only, for Regional Hamilton-Wentworth.
- (j) For Regional Municipality of Hamilton-Wentworth.

Exhibit A-5

**MOTOR VEHICLE ACCIDENT
DEATHS AND RATES**

YEAR	DEATHS	Ontario	Hamilton	RATES/10,000 REGISTERED MOTOR VEHICLE		
	Canada			Canada	Ontario	Hamilton
1931	1,316	574	31	10.96	10.21	
1932	1,120	497	20	10.05	9.35	
1933	955	416	22	8.82	8.00	
1934	1,115	528	27	9.82	9.74	
1935	1,224	571	16	10.42	10.12	
1936	1,316	564	23	10.61	9.56	
1937	1,642	774	39	12.37	12.41	
1938	1,545	677	33	11.08	10.12	
1939	1,584	682	35	11.01	9.99	n/a
1940	1,723	756	46	11.46	10.74	
1941	1,852	835	45	11.78	11.30	
1942	1,409	610	49	9.24	8.53	
1943	1,437	563	41	9.51	8.14	
1944	1,374	526	28	9.14	7.79	
1945	1,556	637	25	10.39	9.61	
1946	1,781	729	33	10.98	10.25	
1947	1,869	753	26	10.17	9.41	
1948	2,086	782	19	10.25	8.94	5.34
1949	2,265	873	29	9.89	9.00	n/a
1950	2,270	850	12	8.74	7.70	2.55
1951	2,686	991	26	9.36	8.22	5.13
1952	2,701	1,040	26	8.56	8.05	4.71
1953	2,906	1,082	17	8.47	7.69	2.84
1954	1,960 (a)	1,045	17	5.38 (a)	7.01	2.71
1955	2,084 (a)	1,111	15	5.28 (a)	6.87	2.22
1956	3,184	1,180	25	7.46	6.90	3.57
1957	3,260	1,279	25	7.25	7.13	3.46
1958	3,118	1,112	21	6.61	5.94	2.77
1959	3,231	1,187	18	6.44	6.01	2.24

YEAR	DEATHS			RATES/10,000 REGISTERED MOTOR VEHICLES		
	Canada	Ontario	Hamilton	Canada	Ontario	Hamilton
1960	3,283	1,166	21	6.25	5.65	2.54
1961	3,426	1,286	19	6.21	6.05	2.22
1962	3,883	1,383	32	6.72	6.35	3.82
1963	4,210	1,421	27	6.93	6.26	3.03
1964	4,652	1,424	32	7.29	5.98	3.43
1965	4,902	1,611	27	7.31	6.40	2.64
1966	5,281	1,596	28	7.51	6.04	2.60
1967	5,429	1,719	39	7.26	6.28	3.63
1968	5,318	1,586	22	6.74	5.53	1.89
1969	5,425	1,683	19	6.57	5.70	1.64
1970	5,080	1,535	23	5.97	5.04	2.00
1971	5,573	1,769	23	6.17	5.51	1.91
1972	6,221	1,934	46	6.56	5.72	3.42
1973	6,706	1,959	23	6.60	5.47	1.63
1974 (b)	6,290	1,748	31	5.72	4.49	2.00
1975	6,061	1,800	26	5.29	4.41	1.60
1976		1,511	29		3.70	1.78
1977	n/a	1,420	34	n/a	3.27	2.00
1978		1,450	47		3.23	2.06
1979		1,560	42		3.36	2.20
1980		1,508	33		3.17	1.43
1981		1,445	31		2.86	1.16
1982		1,138	23		1.88	0.77
1983		1,204	20			n/a
1984			18			

(a) Except Quebec.

(b) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

Exhibit A-6

**HAMILTON/HAMILTON-WENTWORTH
PEDESTRIAN INJURY RATES
HISTORIC TRENDS**

YEAR	PEDESTRIAN	
	Injuries Per 1,000 Population	Fatalities Per 100,000 Population
1951	1.41	7.45
1952	2.13	6.19
1953	2.14	4.14
1954	1.97	5.83
1955	2.29	3.10
1956	1.92	9.01
1957	2.16	6.17
1958	1.78	5.57
1959	1.76	5.03
1960	1.60	4.93
1961	1.96	4.12
1962	1.84	4.83
1963	2.11	5.67
1964	1.89	7.19
1965	2.05	6.00
1966	2.07	5.95
1967	1.89	5.83
1968	2.11	3.41
1969	2.03	2.02
1970	1.81	4.69
1971	1.84	4.29
1972	1.76	6.90
1973	1.87	2.95
1974 (a)	1.41	3.23
1975	1.28	2.69
1976	1.18	3.42
1977	1.22	2.43
1978	1.34	6.14
1979	1.14	3.68
1980	1.03	2.93
1981	1.13	2.50
1982	1.00	2.46
1983	0.95	1.23
1984	0.77	1.47

Note: See also Exhibit 1-2

(a) Reporting area expanded to include new areas patrolled by the Hamilton-Wentworth Regional Police.

**TRENDS DATA
REGRESSION EQUATIONS**

Statistic	Years	Equation (a)	Significant Slope at 95%	99% (b)	Range of Significant Slope at 95%
1. Collision Rate - All (c)	1951 - 1984	$y = -0.208x + 29.87$	Yes	No	-0.006 to -0.409
2. Collision Rate - All (c)	1965 - 1984	$y = -0.907x + 34.71$	Yes	Yes	-0.741 to -1.074
3. Injury Collision Rate	1954 - 1984	$y = 0.077x + 6.41$	Yes	No	0.136 to 0.180
4. Injury Collision Rate	1965 - 1984	$y = -0.138x + 9.87$	Yes	Yes	-0.084 to -0.191
5. Personal Injury Rate	1951 - 1984	$y = 0.193x + 6.68$	Yes	Yes	0.270 to 0.115
6. Personal Injury Rate	1963 - 1984	$y = -0.115x + 13.21$	Yes	No	-0.028 to -0.201
7. Pedestrian Injury Rate	1951 - 1984	$y = -0.033x + 2.25$	Yes	Yes	-0.023 to -0.043
8. Fatality Rate - All Collisions	1951 - 1984	$y = -0.092x + 10.39$	Yes	No	-0.005 to -0.180
9. Pedestrian Fatality Rate	1951 - 1984	$y = -0.122x + 6.65$	Yes	Yes	-0.711 to -0.174

(a) The variable "x" represents the year; "y" the number of collisions expected.

"x" is 1.0 for the first year included in the equation.

"y" is in collisions per 1,000 population for 1 and 2; in injuries

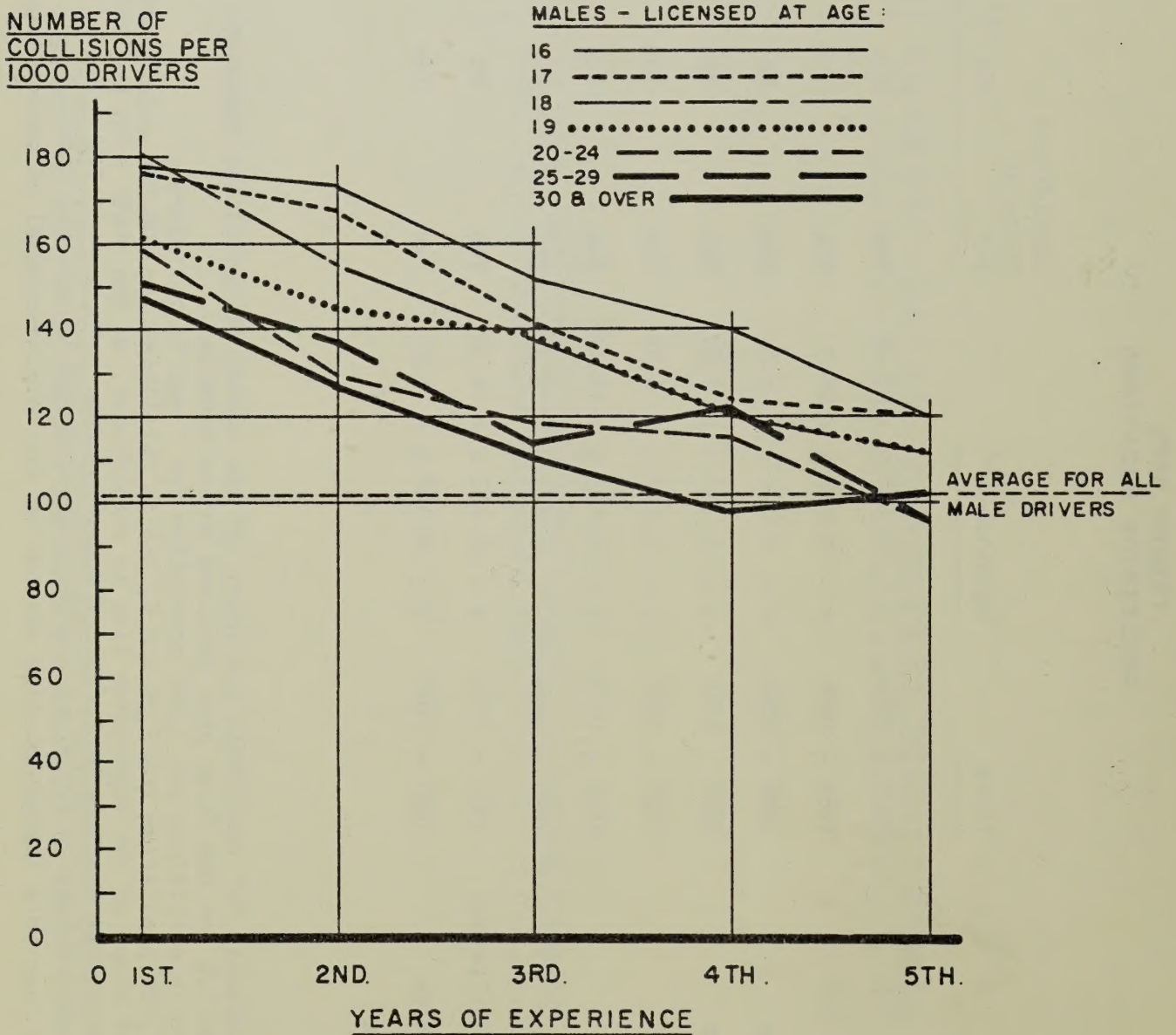
per 1,000 population for 3, 4 and 5; and in fatalities per 100,000 population in 6 and 7.

(b) If the slope of the regression line is significant, we can state with the indicated level of confidence that the slope is not equal to zero.

(c) Includes changes in reporting criteria and reporting area. For this reason, conclusions drawn from this regression line may not be entirely meaningful or appropriate.

APPENDIX A-8

EFFECT OF EXPERIENCE ON COLLISION INVOLVEMENT OF NEW DRIVERS



SOURCE - SYSTEMS RESEARCH & DEVELOPMENT,
ONTARIO MINISTRY OF TRANSPORTATION & COMMUNICATIONS

City or Regional Municipality	Population	Property Damage Only - Collision Reporting Level	Collision Reporting Criteria			Total Collisions	Collisions/ 1,000 Population	Injury Collisions	Injury Collisions/ 1,000 Population
			(a)	(b)	(c) (d)				
Regional									
Hamilton-Wentworth	407,000 (1982)	\$400.00	No	No	Yes Yes (f)	7,228	17.8	2,744	6.7
City of Hamilton	308,402 (1982)	\$400.00	No	No	Yes Yes (f)	5,797	18.8	2,185	7.1
Burlington	117,000 (1984)	\$400.00	No	No	No No Yes (f)	1,653	14.1	593	5.1
Calgary	619,815 (1984)	\$500.00	Yes	Yes	Yes Yes (f)	32,840	53.0	1,921	3.1
Edmonton	560,085 (1983)	\$500.00	No	No	No No Yes	19,469	34.8	4,393	7.8
Halifax	114,594 (1981)	\$500.00	Yes	Yes	Yes Yes	4,726	41.2	616	5.4
London	268,051 (1983)	\$400.00	Yes	Yes	Yes Yes (f)	6,404	23.9	2,124	7.9
City of Montreal	1,020,720 (1983)	\$250.00	No	No	No No Yes	26,038 (g)	25.5	6,735	6.6
Regional									
Ottawa-Carleton	585,398 (1984)	\$400.00	No	No	No No Yes	15,907	27.2	4,295	7.3
Regina (2)	173,400 (1984)	\$500.00	No	No	No No Yes	7,029	40.5	1,398	8.1
Saskatoon	170,748 (1984)	\$500.00	No	No	No No Yes	7,700	45.1	770	4.5
Metro Toronto (3)	2,137,960 (1983)	\$700.00	Yes	Yes	Yes Yes (e)(f)	51,925	24.3	15,330	7.2
Vancouver	416,139 (1984)	\$400.00 (h)	No	No	No No Yes	23,767	57.1	2,618	6.3
Windsor	192,546 (1982)	\$400.00	Yes	Yes	Yes Yes	4,991	25.9	1,786	9.3
Winnipeg	604,627 (1984)	\$500.00	Yes	Yes	Yes Yes	18,293	30.3	4,416	7.3

(1) KEY TO CRITERIA FOR REPORTING COLLISIONS (See next page for definition of injury collisions)

It is generally assumed, unless otherwise noted, that only collisions occurring on public roadways involving personal injury or property damage greater than the reporting level are included on this table.

(a) Collisions reported involving an infraction of the Provincial Highway Traffic Act with property damage only and less than reporting level.

(b) Collisions reported involving an infraction of the Criminal Code of Canada with property damage only and less than reporting level.

(c) Hit and run collisions reported with property damage only and less than reporting level.

(d) Collision reported if it involves any personal injury.

(e) Public property damage collisions.

(f) Collisions involving City or Regional government vehicles.

(g) "With the introduction of amicable constat by insurance companies in July, 1979, a great number of accidents with material damages are not reported and are out of control".

(h) estimated.

(2) Only injuries requiring medical attention were classified as injury collisions.

(3) Injury collisions do not include fatal accidents.

DEFINITIONS OF "PERSONAL INJURY" (a)

Regional Hamilton-Wentworth	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
City of Hamilton	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
Burlington	- any bodily harm, visible or complained of, that results from a motor vehicle collision.
Calgary	- any type of injury resulting from a collision.
Edmonton	- includes minor abrasions and bruises, complaint of pain, caused by a motor vehicle collision.
Halifax	- injury or death (no stipulation regarding severity of injury) caused by a motor vehicle collision.
London	- any type of injury caused by a collision; need not be treated at a hospital.
City of Montreal	- any injury, apparent or not, to any person, caused directly or indirectly, by a motor vehicle.
Regional Ottawa-Carleton	- injury is any bodily harm visible or complaint of, caused by a motor vehicle collision.
City of Regina	- any bodily harm, visible or complaint of, caused by the accident.
Saskatoon	- any bodily harm, visible or complaint of, caused by a collision.
Metro Toronto	- injury must be reported when an injury occurs to any of the involved persons in a collision.
Vancouver	- up to discretion of driver or police if in attendance.
Windsor	- any injury resulting from a motor vehicle collision.
Winnipeg	- readily identifiable injury or perceived injury caused by a collision.

(a) definitions of a "personal injury" such that a collision involving a personal injury must be reported.

Exhibit A-10

**FATAL COLLISION STATISTICS - CANADIAN
AND U.S. CITIES - 1983 (1)**

<u>CITY</u>	<u># OF FATALITIES 1983</u>	<u>RATE PER 100,000 POPULATION</u>	<u>RATE PER 10,000 REGISTERED VEHICLES</u>
HAMILTON (2)	10	5.9	1.2
 AVERAGE OF ALL U.S. CITIES, POPULATION 200,000 - 350,000 REPORTING TO N.S.C. (26 CITIES)	 37.3	 13.8	 2.0
Rochester, N.Y.	13	5.4	0.8
Norfolk, Va.	16	5.7	1.2
St. Paul, Minn.	19	7.2	1.0
Shreveport, La.	15	7.4	1.0
Oakland, Cal.	29	8.6	1.4
Richmond, Va.	21	9.6	1.6
Charlotte, N.C.	29	9.7	1.8
Wichita, Kans.	27	10.1	1.1
Tulsa, Okla.	34	10.3	1.5
Albuquerque, N.M.	33	11.2	1.6
Anaheim, Cal.	24	11.6	1.4
Louisville, Ky.	39	12.3	1.5
Virginia Beach, Va.	31	12.6	3.0
Akron, Ohio	32	13.4	1.7
Long Beach, Cal.	48	14.1	2.1
Sacramento, Cal.	40	14.6	1.8
Birmingham, Ala.	43	15.3	2.0
Mobile, Ala.	34	16.4	3.0
Austin, Tex.	53	16.6	3.1
Baton Rouge, Ca.	54	17.4	3.7
Tucson, Ariz.	59	17.8	2.6
Anchorage, Alas.	37	18.3	2.0

<u>CITY</u>	<u># OF FATALITIES 1983</u>	<u>RATE PER 100,000 POPULATION</u>	<u>RATE PER 10,000 REGISTERED VEHICLES</u>
Corpus Christie, Tex.	41	19.1	3.2
Miami, Fla.	67	19.3	2.4
St. Petersburg, Fla.	53	22.9	2.6
Tampa, Fla.	80	30.3	3.5

NOTE:

- (1) SOURCE: Accident Facts, 1984 Edition, National Safety Council,
444 N. Michigan Avenue, Chicago, Ill. Please note statistics
are for 1983 calendar year.
- (2) Rate is for City of Hamilton only.



THE CORPORATION OF THE CITY OF HAMILTON

City Hall, 71 Main Street West, Hamilton, Ontario L8N 3T4

1985 October 23

Ann Von Rosenbach
Urban Municipal Librarian
Hamilton Public Library
55 York Boulevard
Hamilton, Ontario
L8R 3K1

Dear Sir:

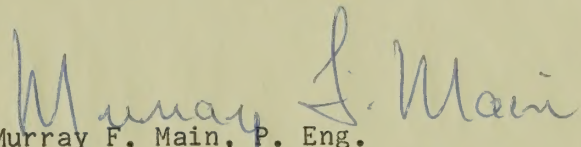
Re: 1984 Hamilton-Wentworth Collision Report

Enclosed please find one copy of the 1984 Hamilton-Wentworth Collision Report as prepared by the City of Hamilton Traffic Department. The report contains statistics regarding motor vehicle collisions within the Regional Municipality of Hamilton-Wentworth for the year 1984.

Should you have additional queries or comments regarding this report, Mr. Brian Malone of this Department (526-4576) would be pleased to respond to them.

We trust you will find the report of interest.

Yours very truly,


Murray F. Main, P. Eng.
Director of Traffic Services


BM:cb
Enclosure

HAMILTON PUBLIC LIBRARY



3 2022 21335354 9